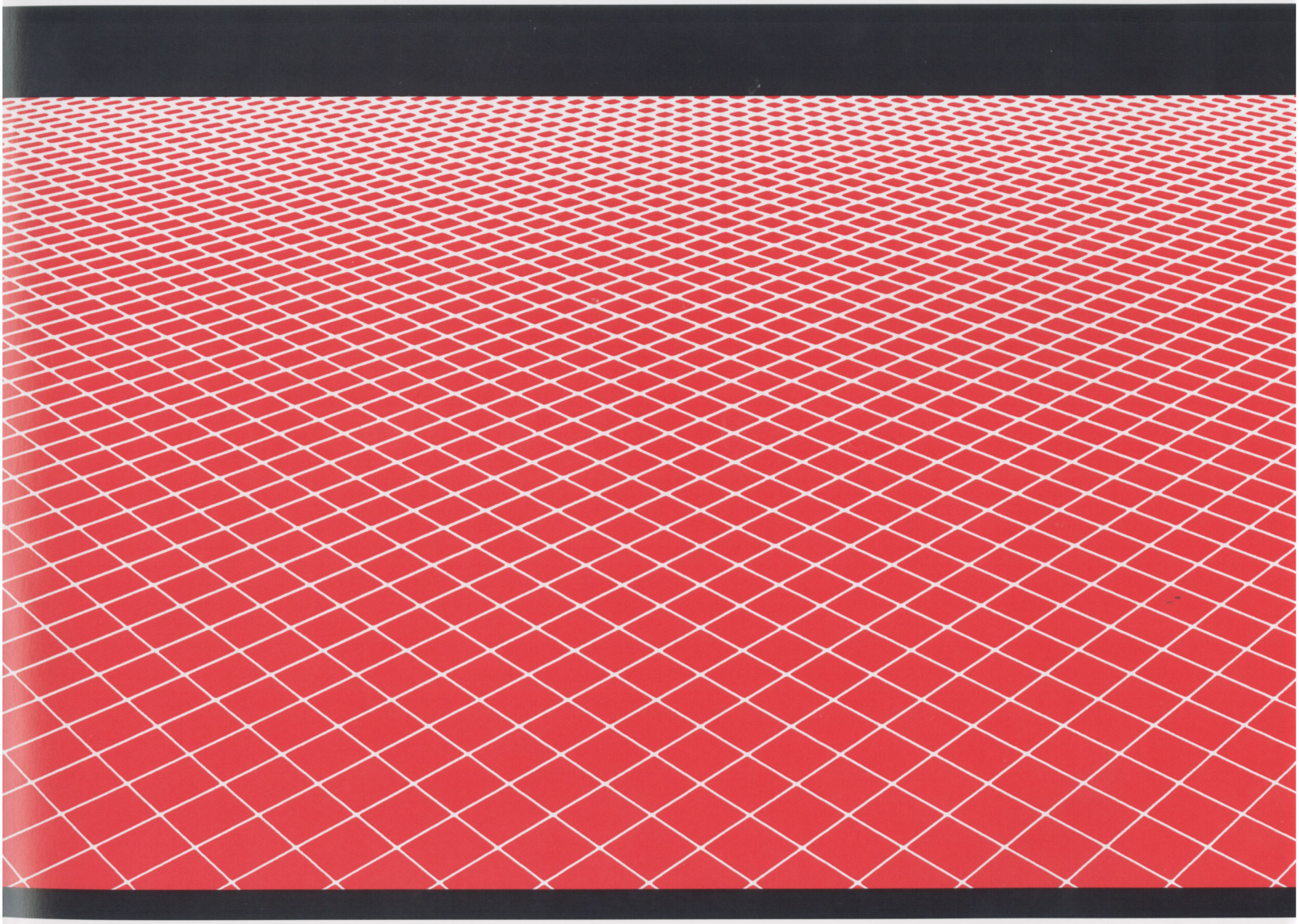
HONDA

SHOP MANUAL

NPS50



NPS505

TYPE CODE

• Throughout this manual, the following abbreviations are used to identify individual model.

CODE	AREA TYPE
E	U.K., Ireland
F	France
ED	EUROPEAN DIRECT SALES (Belgium, Denmark, Germany, Greece, Italy, Spain, Holland, Luxembourg, Austria, Portugal, Finland, Sweden, Switzerland, Hungary, Bulgaria, Czecho, Slovakia, Norway, Iceland, Russia, Poland, Slovenia, Ukraine, Croatia, Latvia, Macedonia, Rumania, Israel)

A Few Words About Safety

Service Information

The service and repair information contained in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools, and equipment could cause injury to you or others. It could also damage the vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of specially designed tools and dedicated equipment. Any person who intends to use a replacement part, service procedure or a tool that is not recommended by Honda, must determine the risks to their personal safety and the safe operation of the vehicle.

If you need to replace a part, use genuine Honda parts with the correct part number or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

For Your Customer's Safety

Proper service and maintenance are essential to the customer's safety and the reliability of the vehicle. Any error or oversight while servicing a vehicle can result in faulty operation, damage to the vehicle, or injury to others.

⚠WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts–wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practice, we recommended that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair procedures. Only you can decide whether or not you should perform a given task.

⚠WARNING

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

Important Safety Precautions

Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:

- Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
- Protect your eyes by using proper safety glasses, goggles or face shields any time you hammer, drill, grind, pry or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
- Use other protective wear when necessary, for example gloves or safety shoes. Handling hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Protect yourself and others whenever you have the vehicle up in the air. Any time you lift the vehicle, either with a hoist or a jack, make sure that it is always securely supported. Use jack stands.

Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards:

- Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
- Burns from hot parts or coolant. Let the engine and exhaust system cool before working in those areas.
- Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers and clothing are out of the way.

Gasoline vapors and hydrogen gases from batteries are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

- Use only a nonflammable solvent, not gasoline, to clean parts.
- Never drain or store gasoline in an open container.
- Keep all cigarettes, sparks and flames away from the battery and all fuel-related parts.

HOW TO USE THIS MANUAL

This service manual describes the service procedures for the NPS50.

Follow the Maintenance Schedule (Section 4) recommendations to ensure that the vehicle is in peak operating condition.

Performing the first scheduled maintenance is very important. It compensates for the initial wear that occurs during the break-in period.

Sections 1 and 4 apply to the whole motorcycle. Section 3 illustrates procedures for removal/installation of components that may be required to perform service described in the following sections.
Section 5 through 19 describe parts of the motorcycle, grouped according to location.

Find the section you want on this page, then turn to the table of contents on the first page of the section.

Most sections start with an assembly or system illustration, service information and troubleshooting for the section. The subsequent pages give detailed procedure.

If you are not familiar with this motorcycle, read Technical Feature in Section 2.

If you don't know the source of the trouble, go to section 21 Troubleshooting.

Your safety, and the safety of others, is very important. To help you make informed decisions we have provided safety messages and other information throughout this manual. Of course, it is not practical or possible to warn you about all the hazards associated with servicing this vehicle.
You must use your own good judgement.
You will find important safety information in a variety of forms including:

- Safety Labels – on the vehicle
- Safety Messages – preceded by a safety alert symbol ⚠ and one of three signal words, DANGER, WARNING, or CAUTION. These signal words mean:

⚠DANGER	You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.
⚠WARNING	You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.
⚠CAUTION	You CAN be HURT if you don't follow instructions.

- Instructions – how to service this vehicle correctly and safely.

As you read this manual, you will find information that is preceded by a NOTICE symbol. The purpose of this message is to help prevent damage to your vehicle, other property, or the environment.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. Honda Motor Co., Ltd. RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION WHATSOEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION. THIS MANUAL IS WRITTEN FOR PERSONS WHO HAVE ACQUIRED BASIC KNOWLEDGE OF MAINTENANCE ON Honda MOTORCYCLES, MOTOR SCOOTERS OR ATVS.

Honda Motor Co., Ltd.
SERVICE PUBLICATION OFFICE

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SYMBOLS

The symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it would be explained specifically in the text without the use of the symbols.

NEW	Replace the part(s) with new one(s) before assembly.
OIL	Use recommended engine oil, unless otherwise specified.
MoS2 OIL	Use molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1:1)
GREASE	Use multi-purpose grease (Lithium based multi-purpose grease NLGI #2 or equivalent).
M	Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent). Example: Molykote® BR-2 plus manufactured by Dow Corning U.S.A. Multi-purpose M-2 manufactured by Mitsubishi Oil, Japan
MP	Use molybdenum disulfide paste (containing more than 40% molybdenum disulfide, NLGI #2 or equivalent). Example: Molykote® G-n Paste manufactured by Dow Corning U.S.A. Honda Moly 60 (U.S.A. only) Rocol ASP manufactured by Rocol Limited, U.K. Rocol Paste manufactured by Sumico Lubricant, Japan
S	Use silicone grease.
LOCK	Apply a locking agent. Use a middle strength locking agent unless otherwise specified.
SEAL	Apply sealant.
BRAKE FLUID	Use DOT 4 brake fluid. Use the recommended brake fluid unless otherwise specified.
FORK	Use Fork or Suspension Fluid.

1. GENERAL INFORMATION

1

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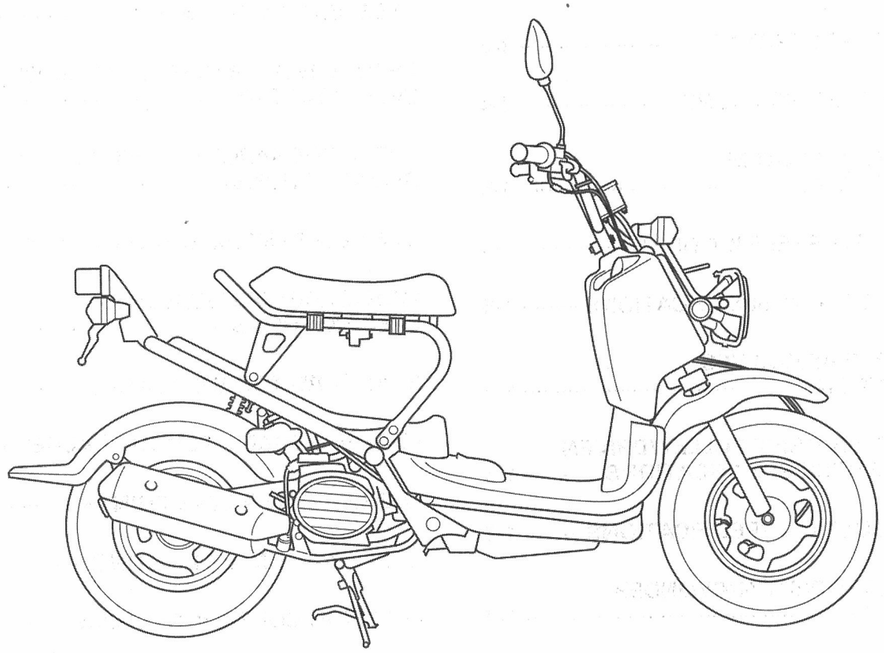
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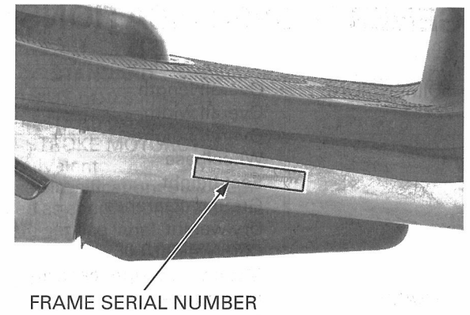
SERVICE RULES

1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may cause damage to the scooter.
2. Use the special tools designed for this product to avoid damage and incorrect assembly.
3. Use only metric tools when servicing the scooter. Metric bolts, nuts and screws are not interchangeable with English fasteners.
4. Install new gaskets, O-rings, cotter pins, and lock plates when reassembling.
5. When tightening bolts or nuts, begin with the larger diameter or inner bolt first. Then tighten to the specified torque diagonally in incremental steps unless a particular sequence is specified.
6. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Route all electrical wires as shown in the Cable and Harness Routing (page 1-15).

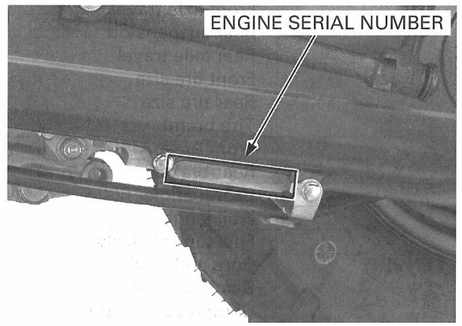
MODEL IDENTIFICATION



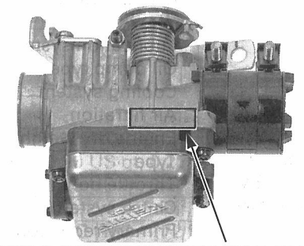
The frame serial number is stamped on the right side of the frame.



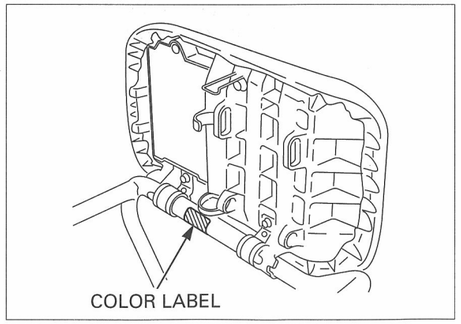
The engine serial number is stamped on the left side of the belt case.



The throttle body identification number is stamped on the left side of the throttle body.



The color label is attached as shown. When ordering color-coded parts, always specify the designated color code.



GENERAL SPECIFICATIONS

ITEM		SPECIFICATION
DIMENSIONS	Overall length	1,860 mm (73.2 in)
	Overall width	735 mm (28.9 in)
	Overall height	1,025 mm (40.4 in)
	Wheelbase	1,265 mm (49.8 in)
	Seat height	735 mm (28.9 in)
	Ground clearance	145 mm (5.7 in)
	Dry weight	84 kg (185 lbs)
	Curb weight	89 kg (196 lbs)
	Maximum weight capacity	112 kg (247 lbs)
FRAME	Frame type	Under bone
	Front suspension	Telescopic fork
	Front wheel travel	55 mm (2.2 in)
	Front axle travel	49 mm (1.9 in)
	Rear suspension	Unit swing
	Rear axle travel	65 mm (2.6 in)
	Front tire size	120/90-10 57J
	Rear tire size	130/90-10 61J
	Tire brand	Front/Rear: KENDA K761
	Front brake	Internal expanding shoe
	Rear brake	Internal expanding shoe
	Caster angle	26° 30′
	Trail length	75 mm (3.0 in)
	Fuel tank capacity	4.8 liter (1.27 US gal, 1.06 Imp gal)
ENGINE	Bore and stroke	37.8 X 44.0 mm (1.49 X 1.73 in)
	Displacement	49.4 cm^3 (3.01 cu-in)
	Compression ratio	12 : 1
	Valve train	Chain drive and OHC
	Intake valve opens	10° BTDC (at 1 mm lift)
	Intake valve closes	15° ABDC (at 1 mm lift)
	Exhaust valve opens	20° BBDC (at 1 mm lift)
	Exhaust valve closes	10° ATDC (at 1 mm lift)
	Lubrication system	Forced pressure and wet sump
	Oil pump type	Trochoid
	Cooling system	Liquid cooled
	Air filtration	Oiled paper element
	Engine dry weight	21.1 kg (46.5 lbs)
FUEL DELIV-ERY SYSTEM	Type	PGM-FI (Programmed Fuel Injection)
	Throttle bore	18 mm (0.7 in)
DRIVE TRAIN	Clutch system	Dry, automatic centrifugal clutch
	Primary reduction	3.500
	Final reduction	3.916
	Gear ratio	2.850 – 1.200
ELECTRICAL	Ignition system	Full transistorized ignition
	Starting system	Electric starter motor and kick starter
	Charging system	Triple phase output alternator
	Lighting system	Battery

LUBRICATION SYSTEM SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	At draining	0.6 liter (0.6 US qt, 0.5 Imp qt)	–
	At disassembly	0.7 liter (0.7 US qt, 0.6 Imp qt)	–
Recommended engine oil		Honda "4-STROKE MOTORCYCLE OIL" or equivalent API service classification: SJ except oils labeled as energy conserving the circular API service label Viscosity: SAE 10W-30 (Use 10W-30 regardless of atmospheric temperature) JASO: MA or MB	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.20 (0.006 – 0.008)	0.22 (0.009)
	Side clearance	0.05 – 0.10 (0.002 – 0.004)	0.12 (0.005)

FUEL SYSTEM SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GQL0A
Idle speed	2,000 ± 100 min^{-1} (rpm)
Throttle grip free play	2 – 6 mm (1/16 – 1/4 in)
IAT (Intake Air Temperature) sensor resistance (20° C/68° F)	2.4 – 2.7 kΩ
ECT (Engine Coolant Temperature) sensor resistance (20° C/68° F)	2.4 – 2.7 kΩ
Fuel injector resistance (20° C/68° F)	11.1 – 12.3 Ω
IAC (Idle Air Control) valve resistance (20° C/68° F)	120 – 140 Ω
PCV control solenoid valve resistance (20° C/68° F)	30 – 34 Ω
Fuel pressure at idle	294 kPa (3.0 kgf/cm^2, 43 psi)
Fuel pump flow (at 12 V)	42 cm^3 (1.4 US oz, 1.5 Imp oz)/10 seconds

COOLING SYSTEM SPECIFICATIONS

ITEM		STANDARD
Coolant capacity	Radiator and engine	0.28 liter (0.30 US qt, 0.25 Imp qt)
	Reserve tank	0.24 liter (0.25 US qt, 0.21 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 16 – 20 psi)
Thermostat	Begin to open	74 – 78 °C (165 – 172 °F)
	Fully open	100 °C (212 °F)
	Valve lift	3.5 mm (0.1 in) minimum
Recommended antifreeze		High quality ethylene glycol antifreeze containing corrosion protection inhibitors
Standard coolant concentration		1:1 mixture with soft water

CYLINDER HEAD/VALVES SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,275 kPa (13.0 kgf/cm², 185 psi) at 950 rpm	–
Cylinder head warpage			–	0.05 (0.002)
Valve, valve guide	Valve clearance	IN	0.10 ±0.03 (0.004 ±0.001)	–
		EX	0.21 ±0.03 (0.008 ±0.001)	–
	Valve stem O.D.	IN	3.475 – 3.490 (0.1368 – 0.1374)	3.465 (0.1364)
		EX	3.465 – 3.480 (0.1364 – 0.1370)	3.455 (0.1360)
	Valve guide I.D.	IN/EX	3.500 – 3.512 (0.1378 – 0.1383)	3.54 (0.139)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.075 (0.0030)
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.085 (0.0033)
	Valve guide projection above cylinder head	IN	9.30 – 9.50 (0.366 – 0.374)	–
		EX	9.30 – 9.50 (0.366 – 0.374)	–
	Valve seat width	IN/EX	0.8 (0.03)	1.3 (0.05)
Valve spring free length		IN/EX	37.11 (1.461)	35.8 (1.41)
Rocker arm	Rocker arm I.D.	IN/EX	10.000 – 10.015 (0.3937 – 0.3943)	10.10 (0.400)
	Rocker arm shaft O.D.	IN/EX	9.972 – 9.987 (0.3926 – 0.3932)	9.91 (0.390)
	Side spring free length		16.0 (0.63)	14.5 (0.57)
Camshaft	Cam lobe height	IN	30.7868 – 31.0268 (1.21208 – 1.22153)	30.75 (1.211)
		EX	29.9308 – 30.1708 (1.17838 – 1.18782)	29.90 (1.177)

KICKSTARTER/DRIVE PULLEY/DRIVEN PULLEY/CLUTCH SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Clutch	Clutch outer I.D.	107.0 – 107.2 (4.21 – 4.22)	107.5 (4.23)
	Lining thickness	–	2.0 (0.08)
Drive belt width		18.15 (0.715)	17.15 (0.68)
Movable drive face	Bushing I.D.	20.035 – 20.085 (0.7888 – 0.7907)	20.13 (0.793)
	Boss O.D.	20.010 – 20.025 (0.7878 – 0.7884)	19.97 (0.786)
	Weight roller O.D.	15.92 – 16.08 (0.627 – 0.633)	15.4 (0.61)
Driven pulley	Face spring free length	85.78 (3.377)	81.5 (3.21)
	Driven face O.D.	33.930 – 33.980 (1.3358 – 1.3378)	33.70 (1.327)
	Movable driven face I.D.	34.015 – 34.035 (1.3392 – 1.3400)	34.29 (1.350)

FINAL REDUCTION SPECIFICATIONS

ITEM	SPECIFICATIONS
Final reduction oil capacity (at disassembly)	0.1 liter (0.11 US qt, 0.09 Imp qt)
Recommended final reduction oil	Hypoid gear oil #90

CRANKSHAFT/PISTON/CYLINDER SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.10 – 0.40 (0.004 – 0.016)	0.60 (0.024)
	Connecting rod radial clearance		0.004 – 0.016 (0.0002 – 0.0006)	0.05 (0.002)
	Runout		–	0.10 (0.004)
Cylinder	I.D.		38.000 – 38.010 (1.4900 – 1.4964)	38.04 (1.4966)
	Out-of-round		–	0.05 (0.002)
	Taper		–	0.05 (0.002)
	Warpage		–	0.05 (0.002)
Piston, piston pin, piston rings	Piston O.D.		37.975 – 37.995 (1.4951 – 1.4959)	37.92 (1.493)
	Piston O.D. measurement point		10 mm (0.4 in) from bottom of skirt	–
	Piston pin bore I.D.		10.002 – 10.008 (0.3938 – 0.3940)	10.04 (0.395)
	Piston pin O.D.		9.994 – 10.000 (0.3935 – 0.3937)	9.98 (0.393)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring-to-ring groove clearance	Top	0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
		Second	0.015 – 0.050 (0.0006 – 0.0020)	0.08 (0.003)
	Piston ring end gap	Top	0.05 – 0.15 (0.002 – 0.006)	0.40 (0.016)
		Second	0.05 – 0.17 (0.002 – 0.007)	0.40 (0.016)
		Oil (side rail)	0.10 – 0.60 (0.004 – 0.024)	0.80 (0.031)
Cylinder-to-piston clearance			0.005 – 0.035 (0.0002 – 0.0014)	0.08 (0.003)
Connecting rod small end I.D.			10.013 – 10.028 (0.3942 – 0.3948)	10.05 (0.396)
Connecting rod-to-piston pin clearance			0.013 – 0.034 (0.0005 – 0.0013)	0.06 (0.002)

FRONT WHEEL/BRAKE/SUSPENSION/STEERING SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	0.8 (0.03)
Cold tire pressure		175 kPa (1.75 kgf/cm², 25 psi)	–
Axle runout		–	0.20 (0.008)
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)
Brake	Front brake lever free play	10 – 20 (3/8 – 13/16)	–
	Drum I.D.	95.0 (3.74)	95.5 (3.76)
Fork	Spring free length	128.5 (5.06)	125.9 (4.96)

REAR WHEEL/BRAKE/SUSPENSION SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	0.8 (0.03)
Cold tire pressure		175 kPa (1.75 kgf/cm², 25 psi)	–
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)
Brake	Rear brake lever free play	10 – 20 (3/8 – 13/16)	–
	Drum I.D.	95.0 (3.74)	95.5 (3.76)

BATTERY/CHARGING SYSTEM SPECIFICATIONS

ITEM			SPECIFICATIONS
Battery	Capacity		12V – 6 Ah
	Current leakage		0.1 mA max.
	Voltage (20 °C/68 °F)	Fully charged	13.0 – 13.2V
		Needs charging	Below 12.3V
	Charging current	Normal	0.6A/5 – 10h
		Quick	3A/1h
Alternator	Capacity		210 W/5,000 min^{-1} (rpm)
	Charging coil resistance (20 °C/68 °F)		0.05 – 0.2 Ω

IGNITION SYSTEM SPECIFICATIONS

ITEM		SPECIFICATIONS
Spark plug	Standard	ER8EH-N (NGK)
Spark plug gap		0.60 – 0.70 mm (0.024 – 0.028 in)
Ignition coil peak voltage		100 V minimum
Ignition timing ("F" mark)		15° BTDC at 2,000 min^{-1} (rpm)

LIGHTS/METERS/SWITCHES SPECIFICATIONS

ITEM			SPECIFICATIONS
Bulbs	Headlight (high/low beam)		12V-35/35W X 2
	Brake/tail light		12V-21/5W
	Front turn signal light		12V-21W X 2
	Rear turn signal light		12V-21W X 2
	Speedometer light		12V-1.7W
	Malfunction indicator lamp (MIL)		LED
	Water temperature indicator		LED
	Fuel reserve indicator		LED
Fuse	Main fuse		20A
	Sub fuse		15A X 2
ECT (Engine Coolant Temperature) sensor resistance		At 50 °C/122 °F	690 – 860 Ω
		At 130 °C /266 °F	68 – 83 Ω

STANDARD TORQUE VALUES

FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)	FASTENER TYPE	TORQUE N·m (kgf·m, lbf·ft)
5 mm hex bolt and nut	5.2 (0.53, 3.8)	5 mm screw	4.2 (0.43, 3.1)
6 mm hex bolt and nut	9.8 (1.0, 7)	6 mm screw	8.8 (0.9, 6.5)
8 mm hex bolt and nut	22 (2.2, 16)	6 mm flange bolt (8 mm head)	8.8 (0.9, 6.5)
10 mm hex bolt and nut	34 (3.5, 25)	6 mm flange bolt (10 mm head) and nut	12 (1.2, 9)
12 mm hex bolt and nut	54 (5.5, 40)	8 mm flange bolt and nut	26 (2.7, 20)
		10 mm flange bolt and nut	39 (4.0, 29)

ENGINE & FRAME TORQUE VALUES

- Torque specifications listed below are for specified fasteners.
- Others should be tightened to standard torque values listed above.

NOTE:

1. Apply oil to the threads and seating surface.
2. Apply sealant to the threads.
3. Apply a locking agent to the threads.
4. ALOC bolt: replace with a new one.
5. U-nut.

ENGINE

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Spark plug	1	8	8.8 (0.9, 6.5)	
Engine oil drain bolt	1	12	25 (2.5, 18)	
Engine oil strainer cap	1	30	20 (2.0, 14)	

LUBRICATION SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Oil pump cover screw	1	3	2.0 (0.2, 1.4)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Fuel feed hose stay bolt	2	6	10 (1.0, 7)	
ECT (Engine Coolant Temperature) sensor	1	12	18 (1.8, 13)	
PCV control solenoid valve bolt	1	5	5.9 (0.6, 4.3)	
Insulator band screw	2	5	2.9 (0.3, 2.1)	

COOLING SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Coolant drain bolt	1	10	0.9 (0.1, 0.7)	
Radiator cover screw	4	4	0.9 (0.1, 0.7)	

CYLINDER HEAD/VALVES

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Cylinder head bolt	4	6	12 (1.2, 9)	NOTE 1
Cam sprocket bolt	2	5	8.8 (0.9, 6.5)	NOTE 1
Cam chain tensioner lifter screw	1	6	4.2 (0.43, 3.1)	

KICKSTARTER/DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Clutch outer nut	1	10	39 (4.0, 29)	
Drive pulley face nut	1	12	32 (3.3, 24)	NOTE 1

FINAL REDUCTION

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Final reduction oil check bolt	1	8	13 (1.3, 9)	

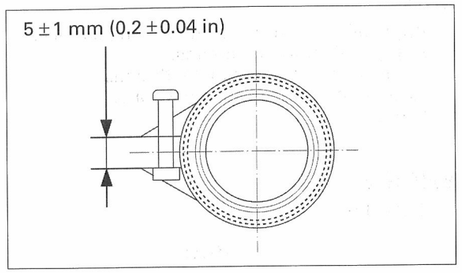
ALTERNATOR/STARTER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Stator socket bolt	3	6	12 (1.2, 9)	
Flywheel nut	1	12	44 (4.5, 33)	
Radiator cooling fan bolt	3	6	7.8 (0.8, 5.8)	

CRANKSHAFT/PISTON/CYLINDER

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Crankcase bolt	9	6	12 (1.2, 9)	NOTE 1

Insulator clamp:



FRAME

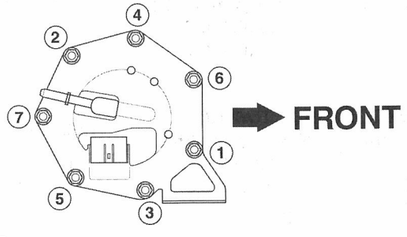
FRAME/BODY PANELS/EXHAUST SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Muffler protector bolt	2	5	5.2 (0.53, 3.8)	

MAINTENANCE

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Air cleaner housing cover screw	7	5	1.2 (0.12, 0.9)	

FUEL SYSTEM

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Bank angle sensor mounting screw	2	4	1.2 (0.12, 0.9)	
Breather hose joint screw	1	4	0.8 (0.08, 0.6)	
Fuel pump unit mounting nut	7	6	12 (1.2, 9)	
				
O_2 sensor	1	18	44 (4.5, 33)	

ENGINE MOUNTING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Engine hanger link bolt (frame side)	2	10	39 (4.0, 29)	
Engine mounting nut (engine side)	1	10	49 (5.0, 36)	NOTE 5

FRONT WHEEL/BRAKE/SUSPENSION/STEERING

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front axle nut	1	10	44 (4.5, 33)	NOTE 5
Front brake arm bolt	1	5	6.0 (0.62, 4.5)	
Front/rear brake lever pivot bolt	1/1	5/5	1.0 (0.11, 0.8)	
Front/rear brake lever pivot nut	1/1	5/5	5.2 (0.53, 3.8)	
Handle post nut	1	10	39 (4.0, 29)	
Steering stem lock nut	1	BC1	69 (7.0, 51)	

REAR WHEEL/BRAKE/SUSPENSION

ITEM		Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Rear axle nut		1	14	118 (12.0, 87)	NOTE 1, 5
Rear brake arm bolt		1	5	5.0 (0.51, 3.7)	NOTE 4
Rear shock absorber mounting bolt	(UPPER)	1	10	40 (4.1, 30)	
	(LOWER)	1	8	26 (2.7, 20)	

LIGHTS/METERS/SWITCHES

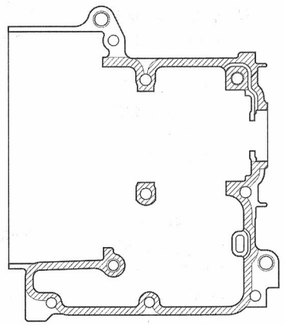
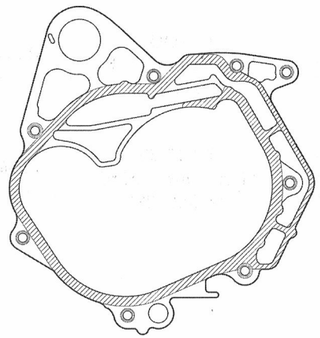
ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Turn signal light mounting nut	4	10	9.8 (1.0, 7)	

OTHERS

ITEM	Q'TY	THREAD DIA. (mm)	TORQUE N·m (kgf·m, lbf·ft)	REMARKS
Front/rear frame assembly bolt	4	10	44 (4.5, 33)	

LUBRICATION & SEAL POINTS

ENGINE

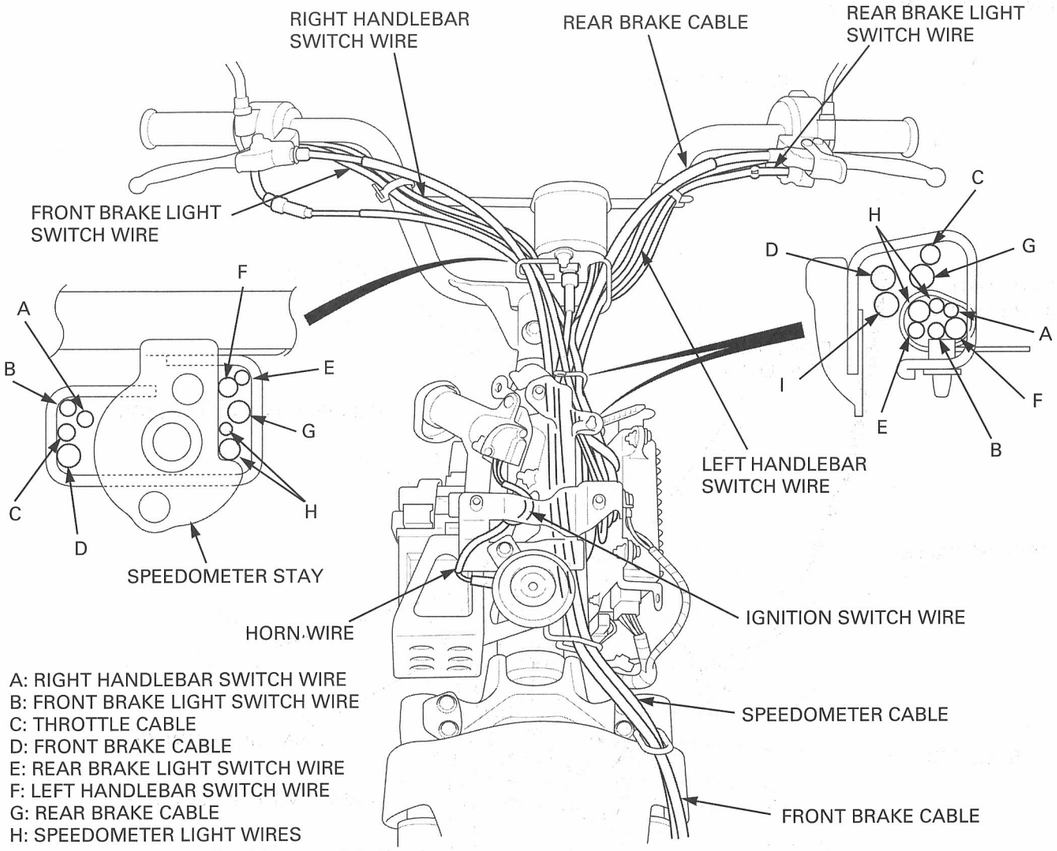
LOCATION	MATERIAL	REMARKS
Crankcase dowel pin Crankcase mating surface  Transmission case mating surface 	Liquid sealant (Three Bond 1207B or equivalent)	Do not apply sealant to the sensor threads head. See page 13-12 See page 11-12
Kickstarter spindle seating surface Kickstarter driven gear seating surface/friction spring sliding surface	Molybdenum disulfide paste	Apply 0.2 – 0.5g.
Final shaft seating surface (belt case side) Countershaft seating surface	Molybdenum disulfide grease	Apply 0.3 – 0.5g. Apply 0.5 – 1.0g.
Rocker arm sliding and slipper surface Valve stem (valve guide sliding surface) Camshaft cam lobes	Molybdenum disulfide oil (a mixture of 1/2 engine oil and 1/2 molybdenum disulfide grease)	
Driven face bearing	Multi-purpose grease	

LOCATION	MATERIAL	REMARKS
Oil pump drive, driven gear teeth and sliding surface Oil pump driven gear sliding surface Stator base bearing area Camshaft bearing Rocker arm shaft sliding surface Cylinder head bolt threads and seating surfaces (6 X 119 mm) Piston pin outer surface Piston and cylinder sliding surfaces Piston ring groove, pin hole of piston Cam sprocket bolt threads and seating surfaces Drive pulley face nut threads and seating surface Piston ring whole surface Each transmission gear teeth Crankcase bolt threads and seating surface Connecting rod big end bearing Connecting rod small end hole Crankshaft main journal bearings Timing sprocket teeth of crankshaft Cam chain Oil seal lips and outer surfaces Cam sprocket gear teeth Each O-ring whole surface	Engine oil	Fill up 3 cc. Fill up 2 cc per each bearing.

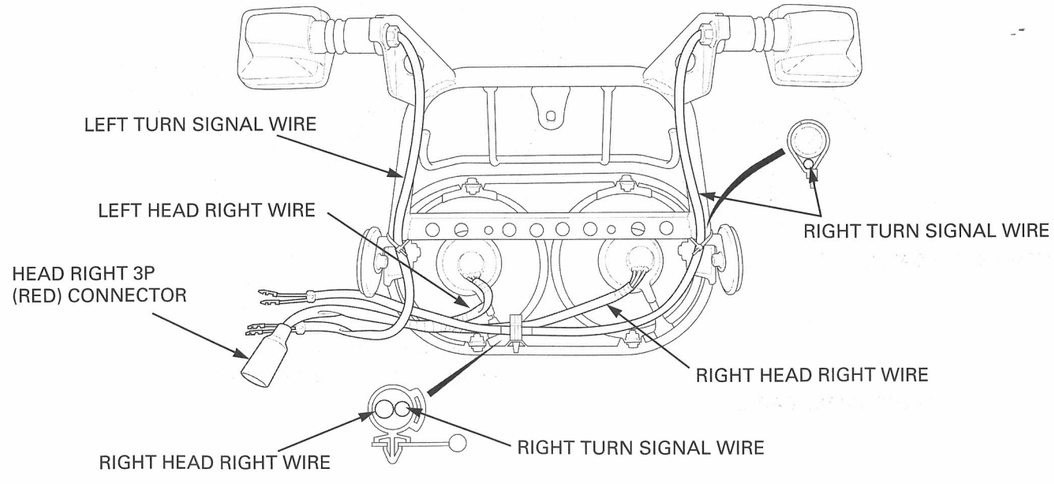
FRAME

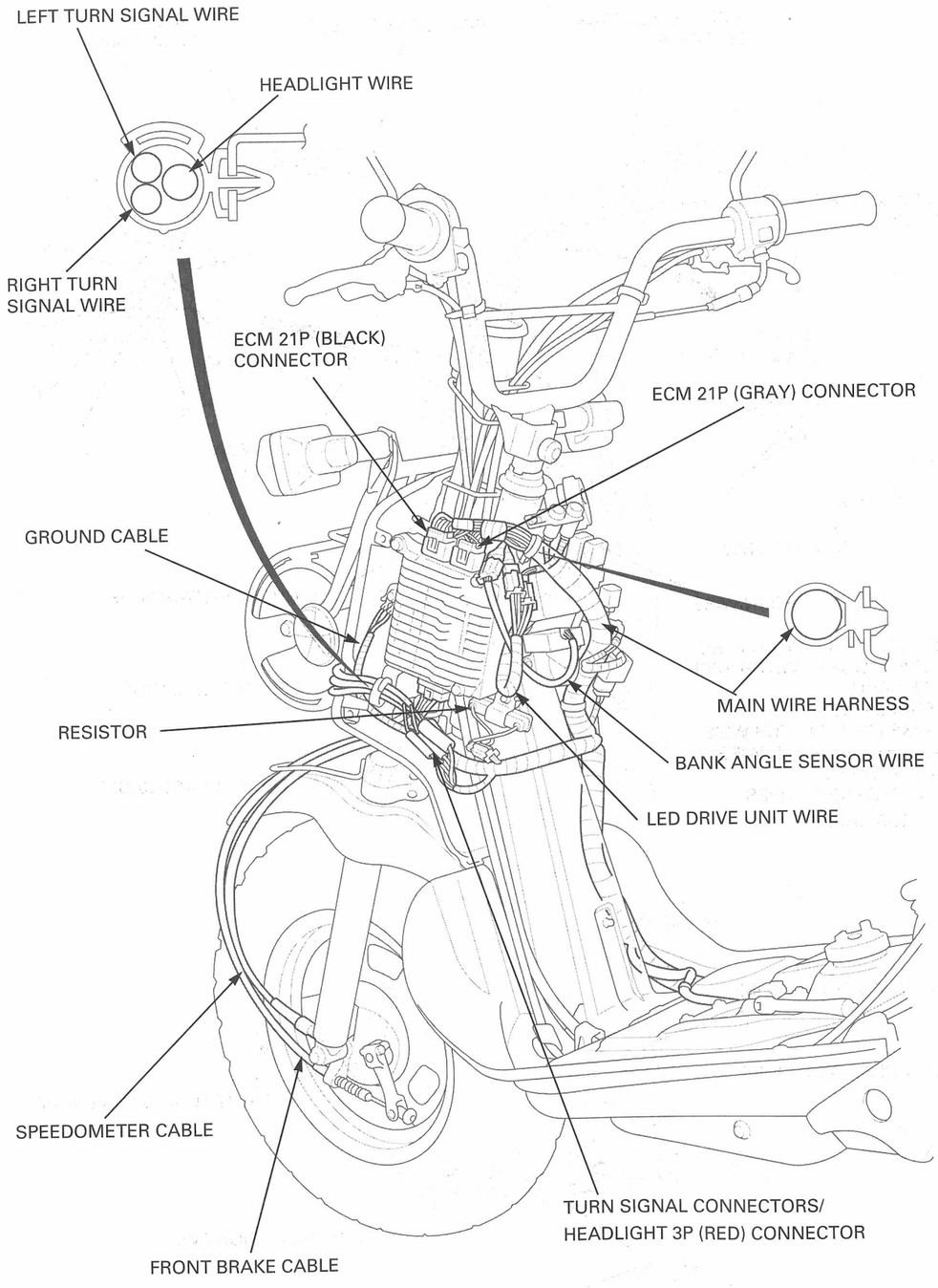
LOCATION	MATERIAL	REMARKS
Front wheel dust seal lips Front brake panel dust seal lips Rear brake cam Rear brake anchor pin Throttle grip pipe flange cable groove Brake lever pivots Main stand pivot	Multi-purpose grease	
Front brake cam Front brake anchor pin	Multi-purpose grease (Daphne eponex No.2 or equivalent)	
Speedometer gear teeth	Multi-purpose grease (Daphne eponex No.0 or equivalent)	
Steering stem bearings and race sliding surface	Urea based multi-purpose grease with extreme pressure (example: EXCE-LIGHT EP2 manufactured by KYODO YUSHI, japan), Shell stamina EP2 or equivalent	Apply 3 – 5g per each bearing.
Fork spring Fork rebound spring Fork guide bushing sliding surface Fork dust seal lips	Bearing grease class 2 grade 3 (CHU-KYOU KASEI) or equivalent	Apply grease 6.5 – 8g.
Front/rear brake cam felt seal Rear axle nut threads and seating surface	Engine oil	
Throttle cable casing inside Brake cable casing inside	Cable lubricant	
Handlebar grip rubber inside Air cleaner connecting hose-to-housing mating area	Honda bond A or equivalent	

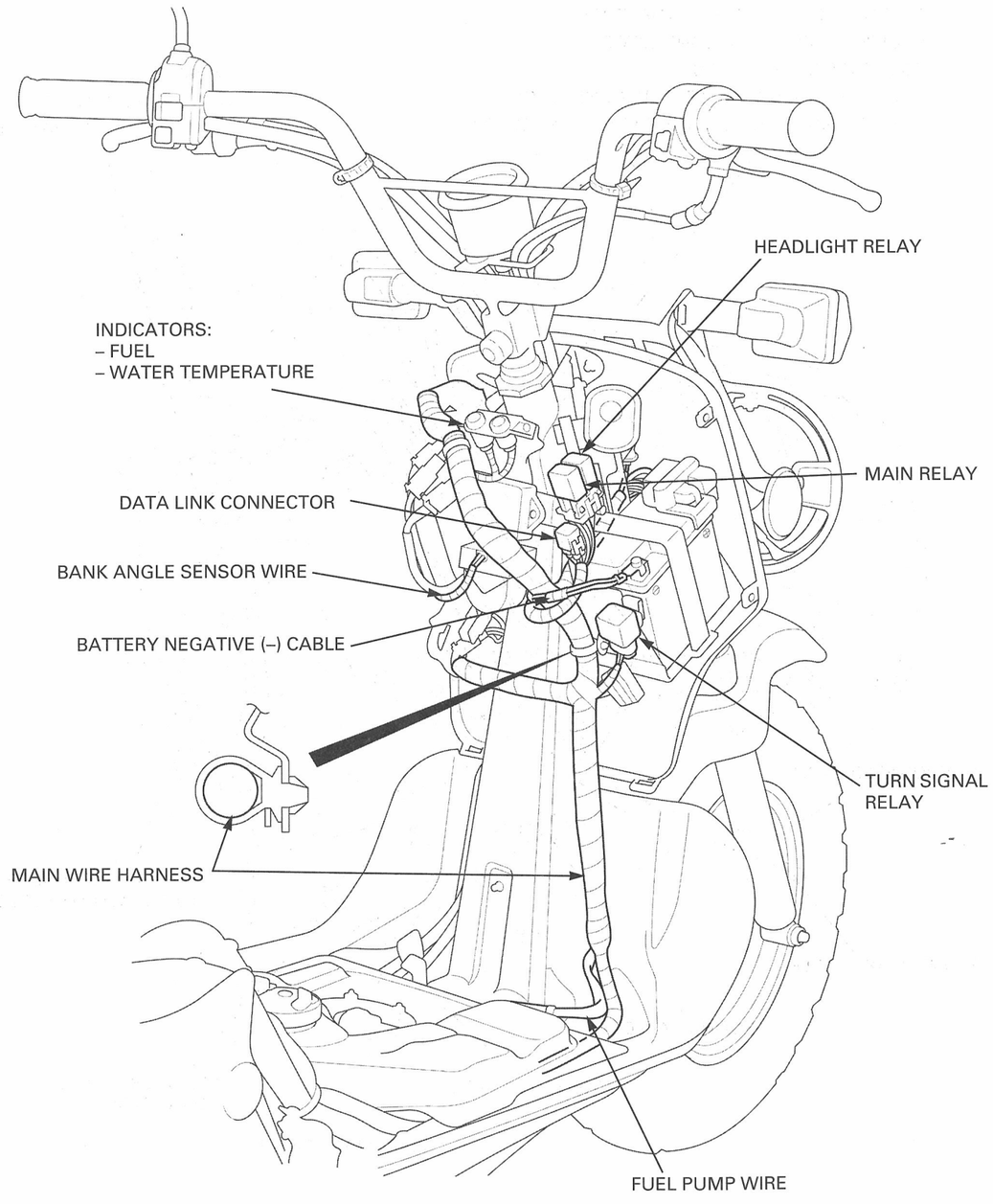
CABLE & HARNESS ROUTING



A: RIGHT HANDLEBAR SWITCH WIRE
B: FRONT BRAKE LIGHT SWITCH WIRE
C: THROTTLE CABLE
D: FRONT BRAKE CABLE
E: REAR BRAKE LIGHT SWITCH WIRE
F: LEFT HANDLEBAR SWITCH WIRE
G: REAR BRAKE CABLE
H: SPEEDOMETER LIGHT WIRES
I: SPEEDOMETER CABLE

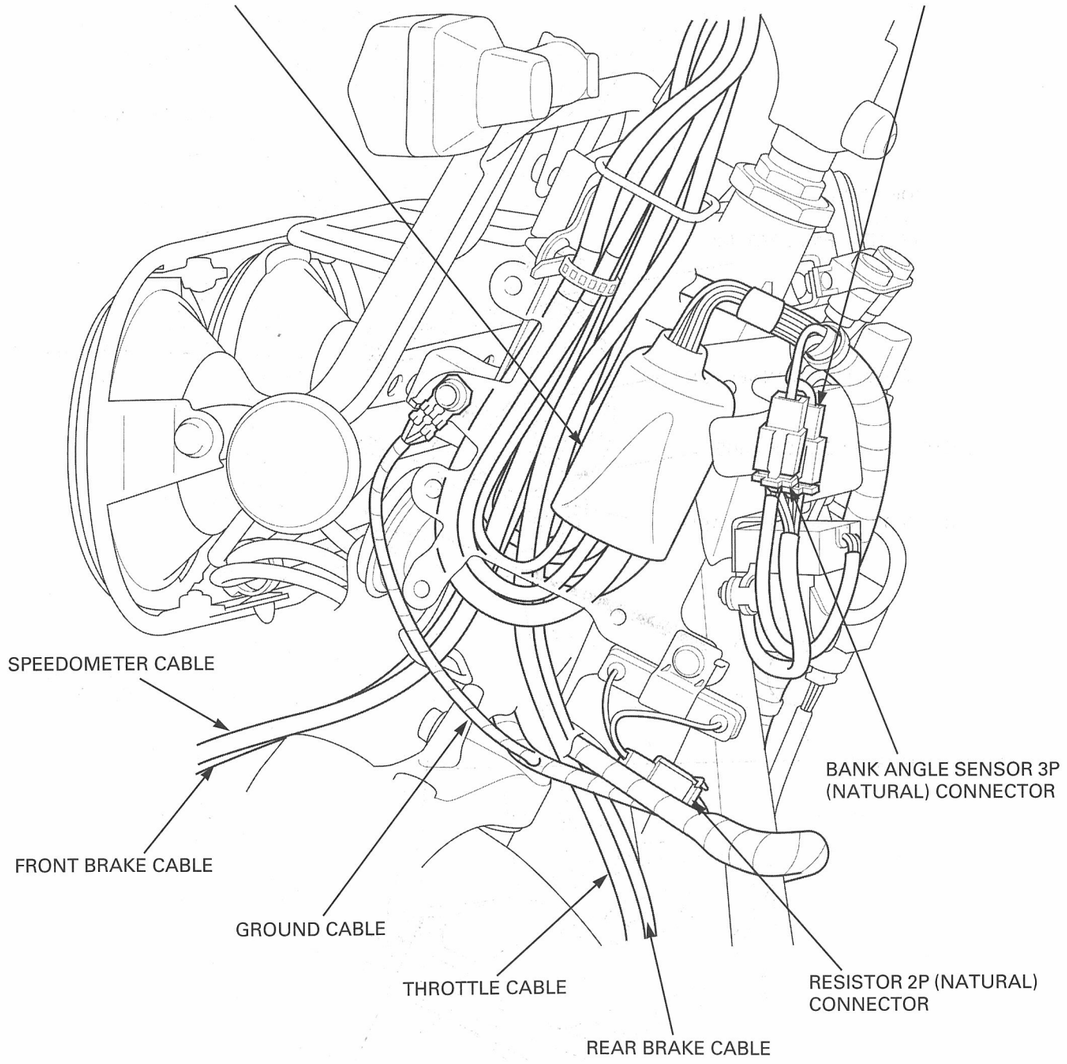


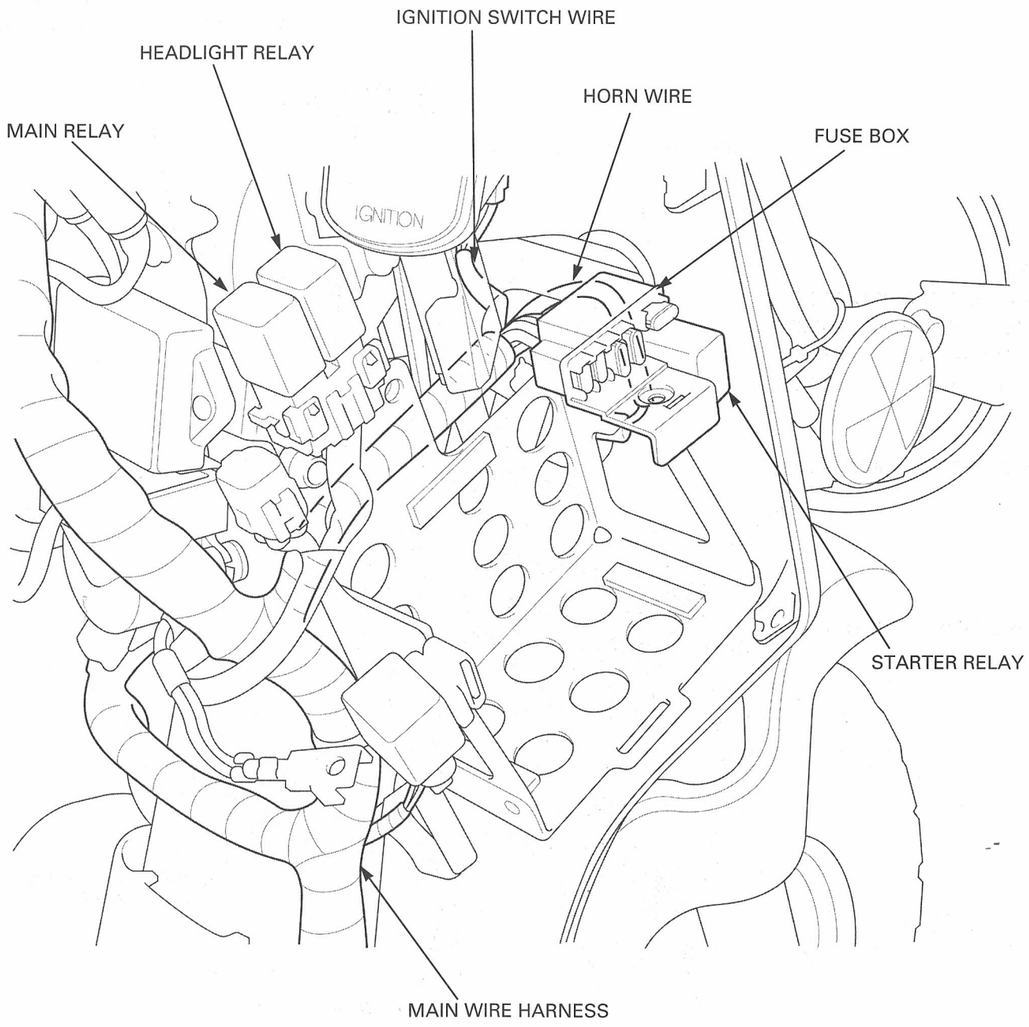

LEFT TURN SIGNAL WIRE
HEADLIGHT WIRE
RIGHT TURN SIGNAL WIRE
ECM 21P (BLACK) CONNECTOR
ECM 21P (GRAY) CONNECTOR
GROUND CABLE
MAIN WIRE HARNESS
RESISTOR
BANK ANGLE SENSOR WIRE
LED DRIVE UNIT WIRE
SPEEDOMETER CABLE
TURN SIGNAL CONNECTORS/
HEADLIGHT 3P (RED) CONNECTOR
FRONT BRAKE CABLE

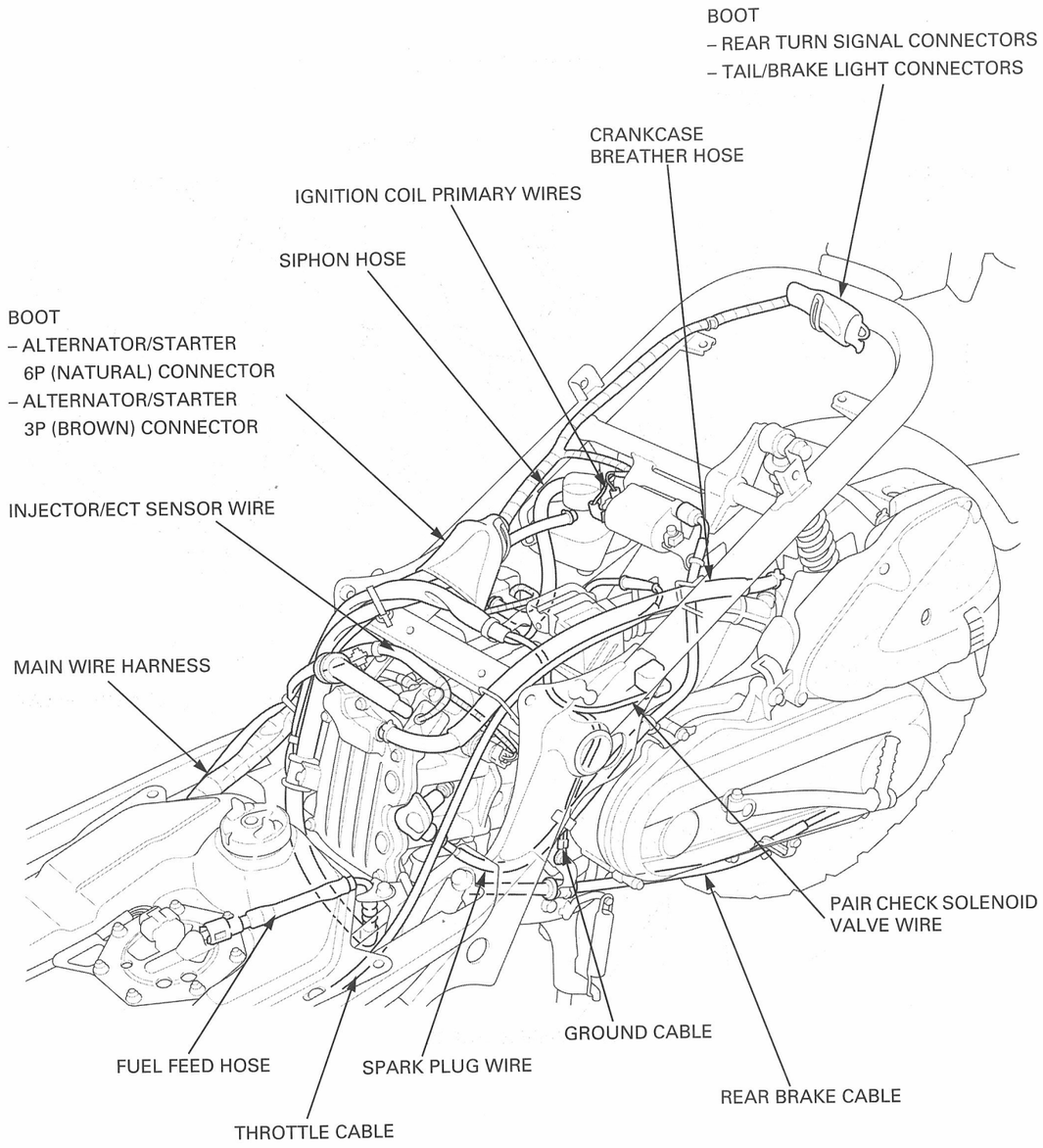

HEADLIGHT RELAY
INDICATORS:
– FUEL
– WATER TEMPERATURE
MAIN RELAY
DATA LINK CONNECTOR
BANK ANGLE SENSOR WIRE
BATTERY NEGATIVE (–) CABLE
TURN SIGNAL RELAY
MAIN WIRE HARNESS
FUEL PUMP WIRE

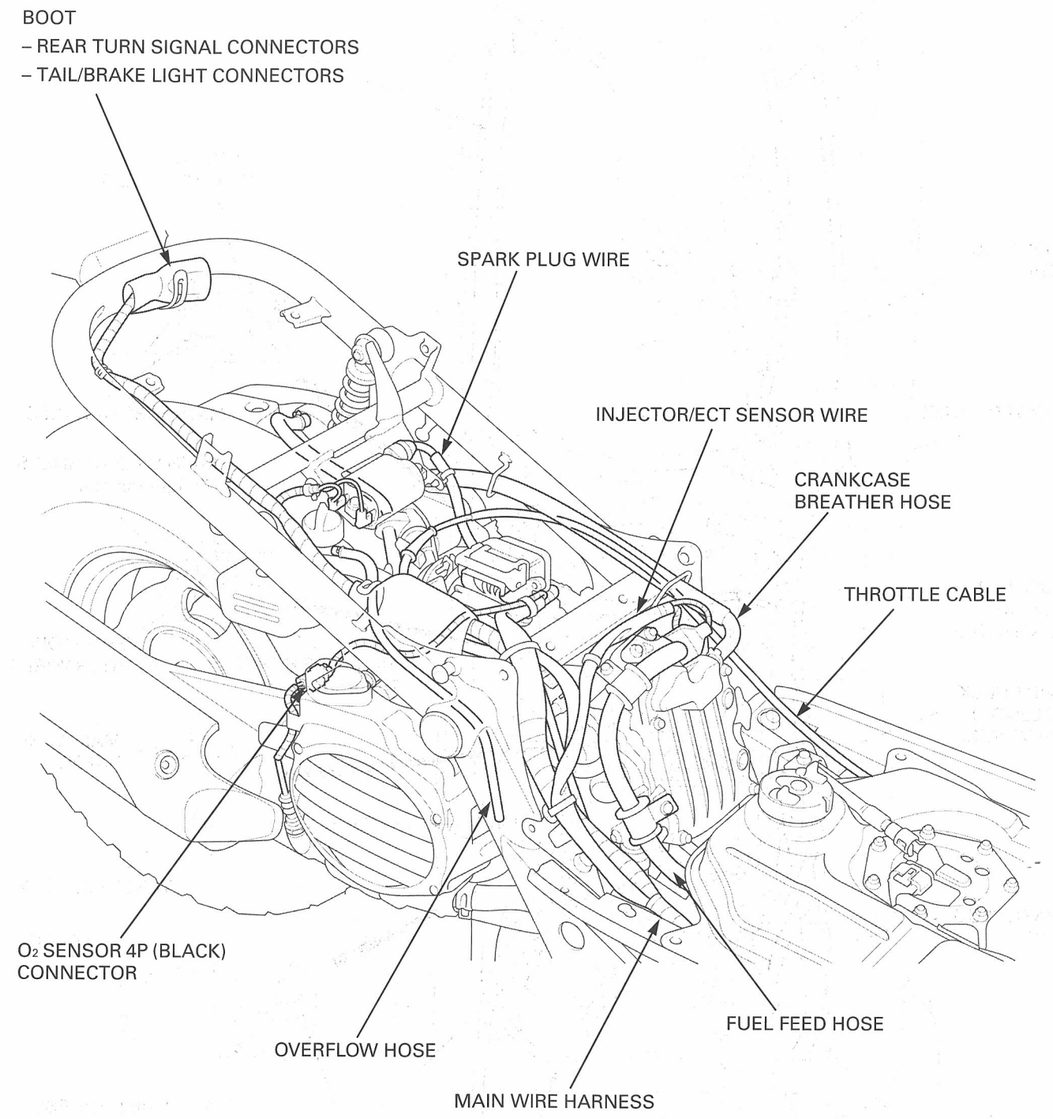
BOOT
– FRONT BRAKE LIGHT SWITCH CONNECTORS
– REAR BRAKE LIGHT SWITCH CONNECTORS
– SPEEDOMETER 3P (BLACK) CONNECTOR
– SPEEDOMETER CONNECTORS
– RIGHT HANDLEBAR SWITCH 2P (RED) CONNECTOR
– LEFT HANDLEBAR SWITCH 2P (NATURAL) CONNECTOR

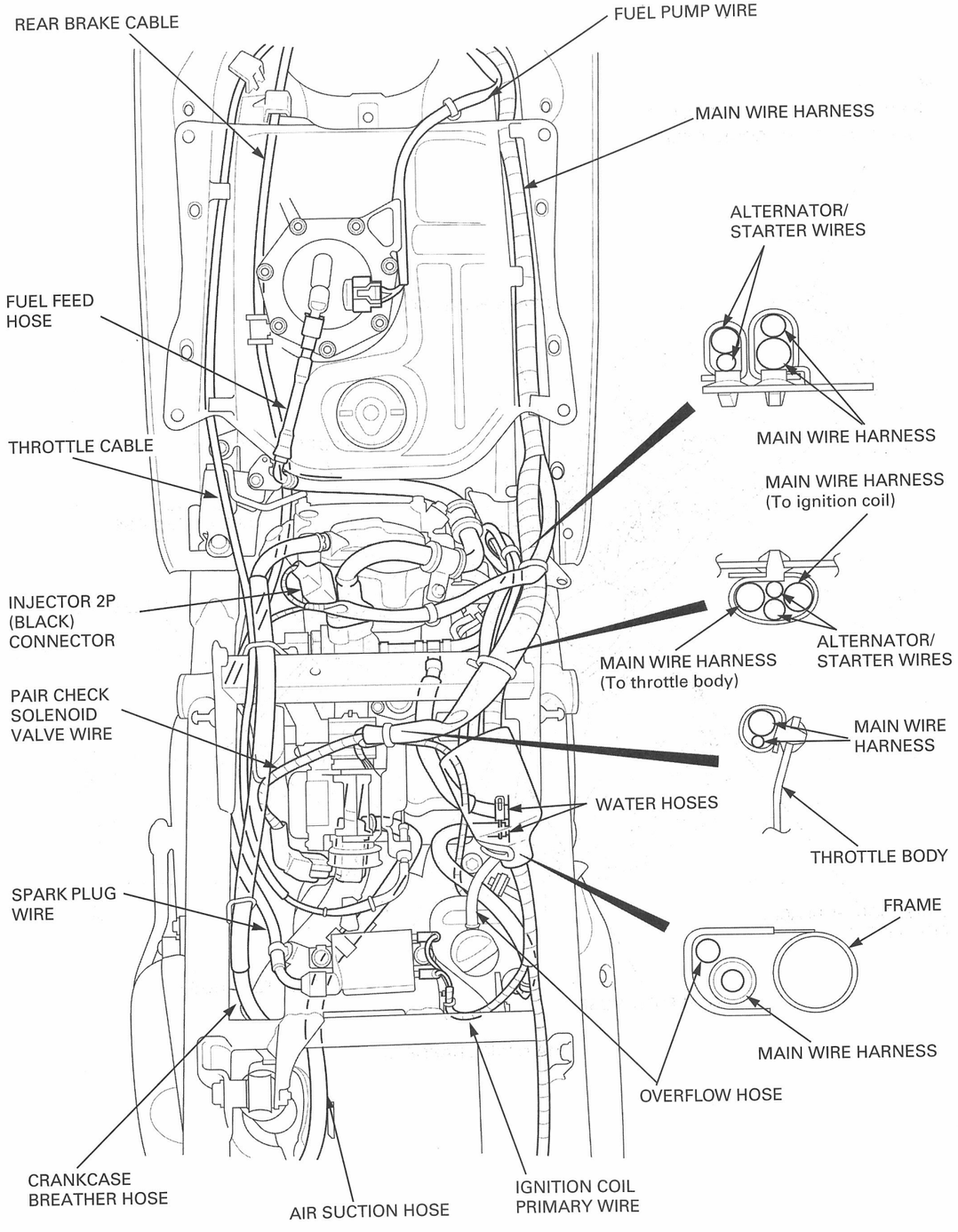
LED DRIVE UNIT
– 4P (BLACK) CONNECTOR
– 4P (NATURAL) CONNECTOR

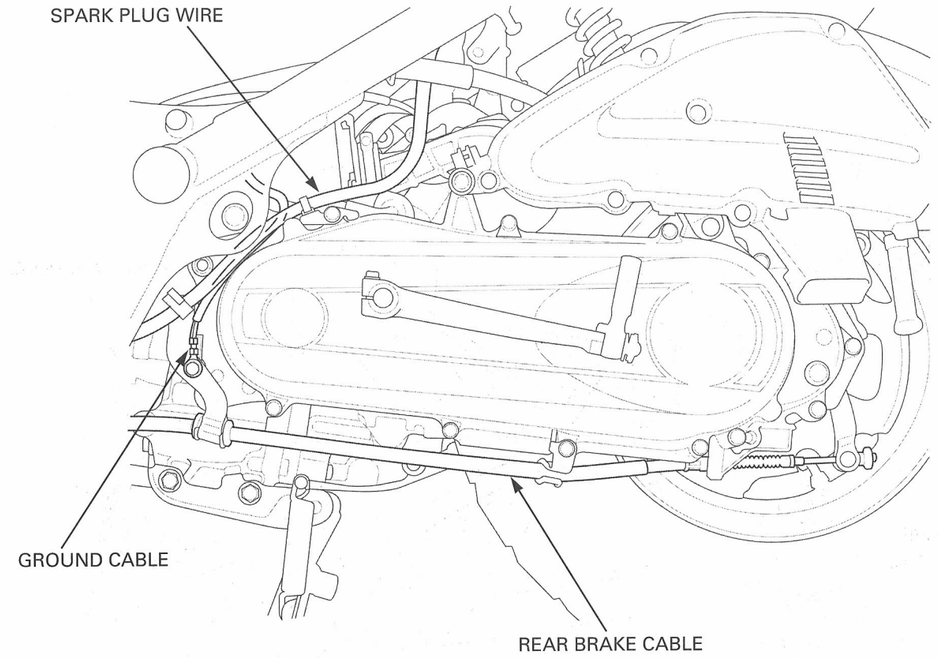


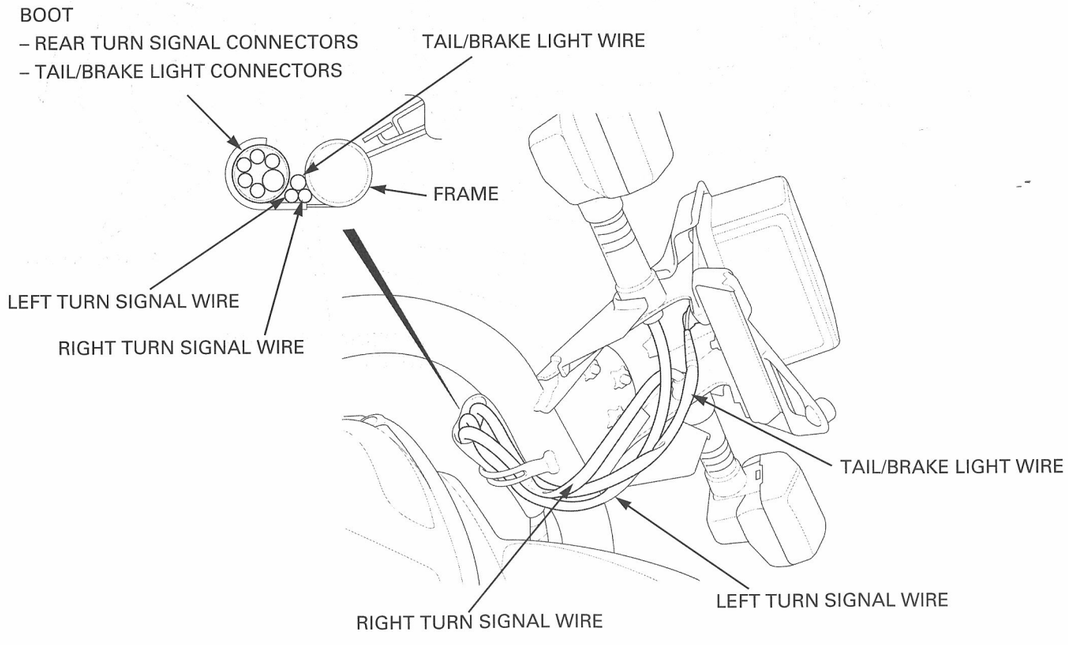


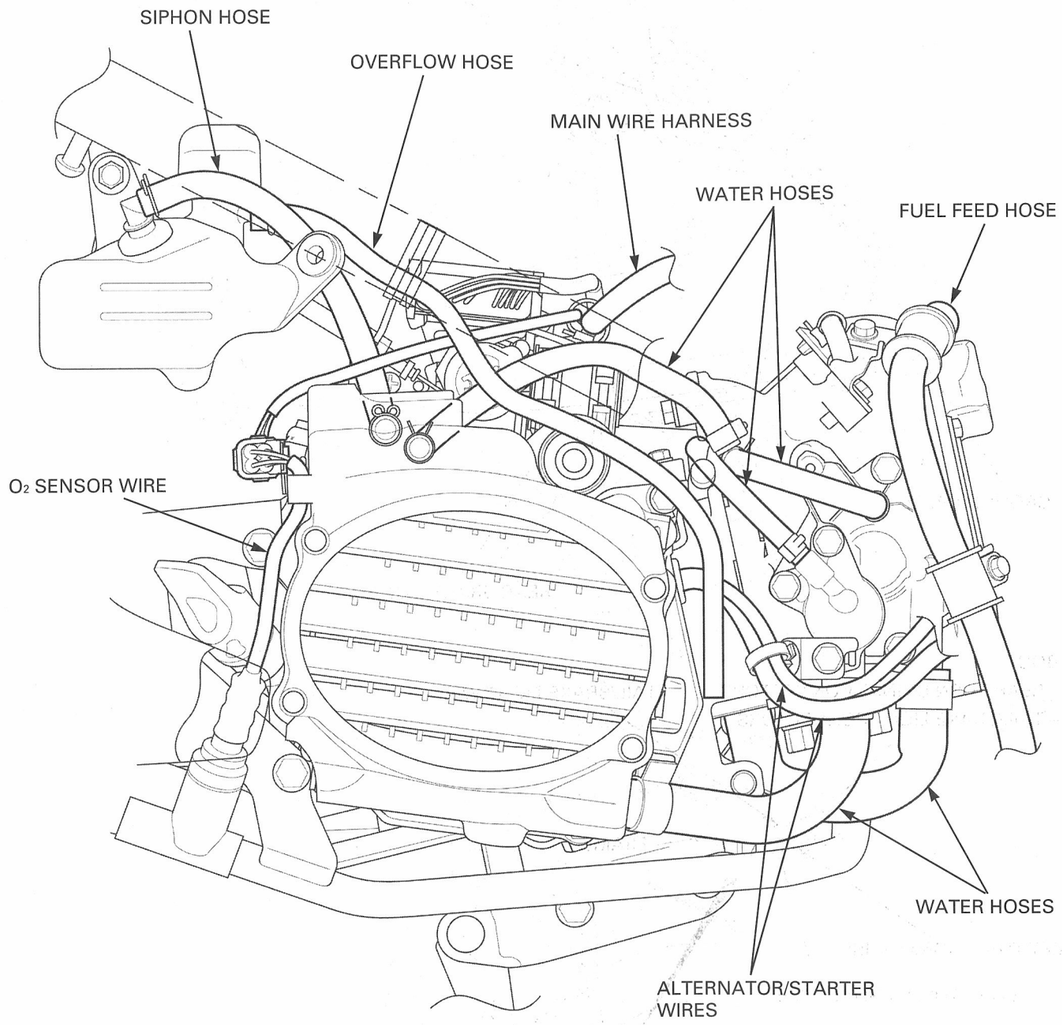

BOOT
– REAR TURN SIGNAL CONNECTORS
– TAIL/BRAKE LIGHT CONNECTORS
CRANKCASE BREATHER HOSE
IGNITION COIL PRIMARY WIRES
SIPHON HOSE
BOOT
– ALTERNATOR/STARTER 6P (NATURAL) CONNECTOR
– ALTERNATOR/STARTER 3P (BROWN) CONNECTOR
INJECTOR/ECT SENSOR WIRE
MAIN WIRE HARNESS
PAIR CHECK SOLENOID VALVE WIRE
GROUND CABLE
FUEL FEED HOSE
SPARK PLUG WIRE
REAR BRAKE CABLE
THROTTLE CABLE


BOOT
– REAR TURN SIGNAL CONNECTORS
– TAIL/BRAKE LIGHT CONNECTORS
SPARK PLUG WIRE
INJECTOR/ECT SENSOR WIRE
CRANKCASE BREATHER HOSE
THROTTLE CABLE
O_2 SENSOR 4P (BLACK) CONNECTOR
OVERFLOW HOSE
FUEL FEED HOSE
MAIN WIRE HARNESS


REAR BRAKE CABLE
FUEL PUMP WIRE
MAIN WIRE HARNESS
ALTERNATOR/
STARTER WIRES
FUEL FEED
HOSE
MAIN WIRE HARNESS
THROTTLE CABLE
MAIN WIRE HARNESS
(To ignition coil)
INJECTOR 2P
(BLACK)
CONNECTOR
ALTERNATOR/
STARTER WIRES
MAIN WIRE HARNESS
(To throttle body)
PAIR CHECK
SOLENOID
VALVE WIRE
MAIN WIRE
HARNESS
WATER HOSES
THROTTLE BODY
SPARK PLUG
WIRE
FRAME
MAIN WIRE HARNESS
OVERFLOW HOSE
CRANKCASE
BREATHER HOSE
AIR SUCTION HOSE
IGNITION COIL
PRIMARY WIRE


SPARK PLUG WIRE
GROUND CABLE
REAR BRAKE CABLE


BOOT
– REAR TURN SIGNAL CONNECTORS
– TAIL/BRAKE LIGHT CONNECTORS
TAIL/BRAKE LIGHT WIRE
FRAME
LEFT TURN SIGNAL WIRE
RIGHT TURN SIGNAL WIRE
TAIL/BRAKE LIGHT WIRE
LEFT TURN SIGNAL WIRE
RIGHT TURN SIGNAL WIRE



EMISSION CONTROL SYSTEMS

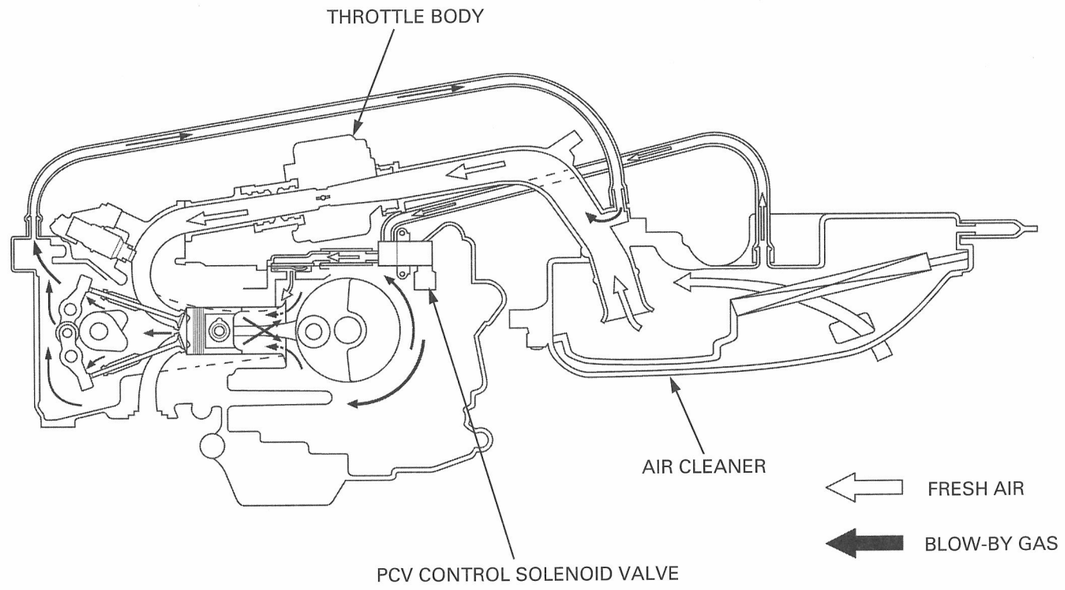
SOURCE OF EMISSIONS

The combustion process produces carbon monoxide, oxides of nitrogen and hydrocarbons. Control of oxides of nitrogen and hydrocarbons is very important because, under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

Honda Motor Co., Ltd. utilizes various system, to reduce carbon monoxide, oxides of nitrogen and hydrocarbons.

CRANKCASE EMISSION CONTROL SYSTEM

The engine is equipped with a closed crankcase system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas is returned to the combustion chamber through the air cleaner and throttle body.



EXHAUST EMISSION CONTROL SYSTEM

The exhaust emission control system is composed of a lean fuel injection setting. No adjustment should be made except idle speed adjustment with the throttle stop screw. The exhaust emission control system is separate from the crankcase emission control system.

THREE-WAY CATALYSTIC CONVERTER

This motorcycle is equipped with three-way catalystic converter. The three-way catalystic converter is in the exhaust system. Through chemical reactions, they convert HC, CO, and NOx in the engine's exhaust to carbon dioxide (CO_2), dinitrogen (N2), and water vaper.

2. TECHNICAL FEATURES

MAGNETIC-COUPLING WATER PUMP 2-2

PGM-FI (Programmed Fuel Injection) SYSTEM 2-3

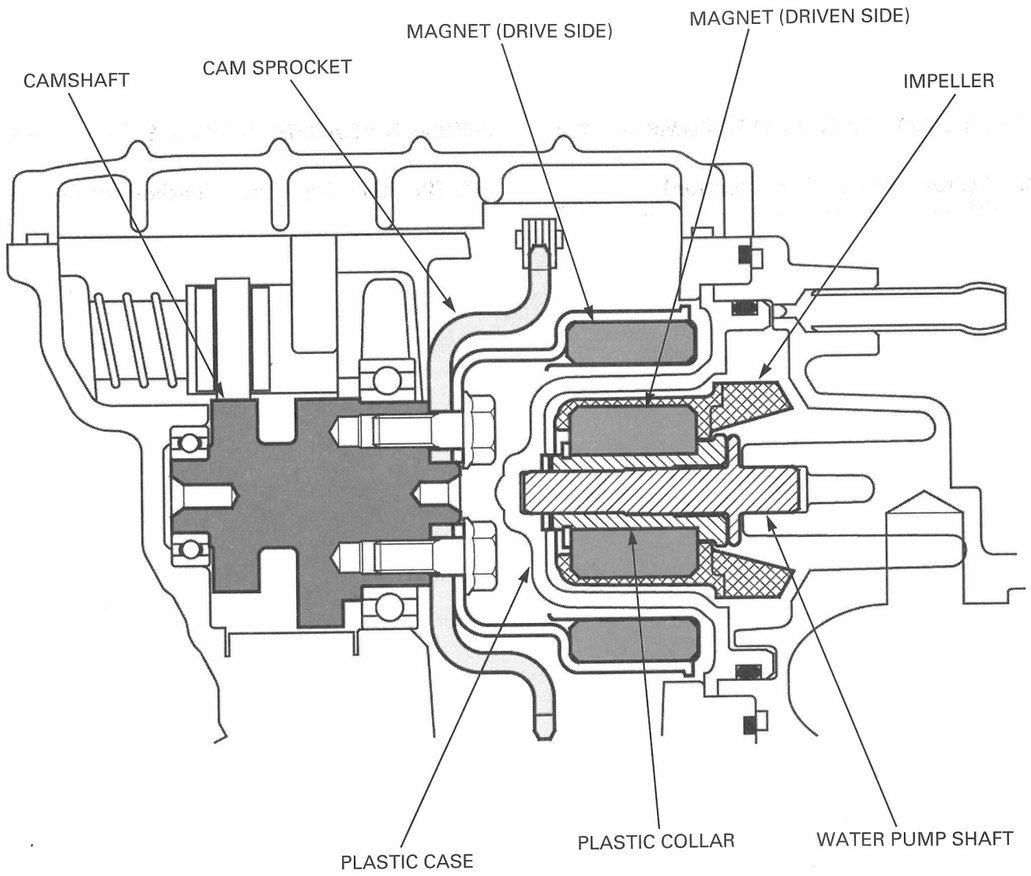
ENGINE MANAGEMENT SYSTEM 2-4

PCV (Positive Crankcase Ventilation) 2-7

MAGNETIC-COUPLING WATER PUMP

This scooter uses a magnetic-coupling water pump. Magnetic forces drive the impeller via the plastic case, which separates the coolant from the engine oil. A plastic collar acts as a bearing.

Compared to a conventional type water pump, this pump eliminates the mechanical seal, oil seal and ball bearing, allowing for a compact pump with reduced friction.



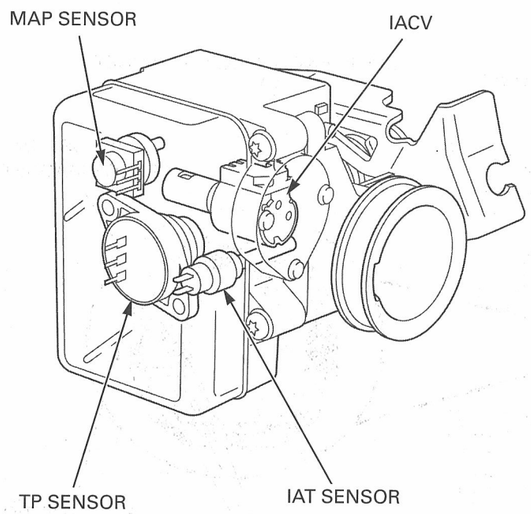
PGM-FI (Programmed Fuel Injection) SYSTEM

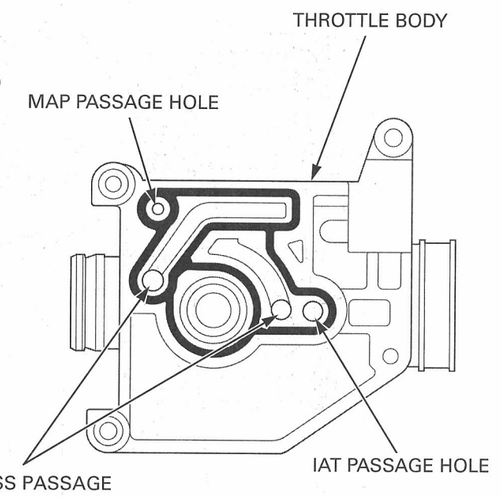
SENSOR INTEGRATED MODULE THROTTLE BODY

This scooter is equipped with the throttle body integrated with the following sensors and device. This throttle body realizes a compact design with simplified inspection capabilities.

- MAP (Manifold Absolute Pressure) sensor: detects the intake air pressure
- TP (Throttle Position) sensor: detects the throttle opening position
- IAT (Intake Air Temperature) sensor: detects the intake air temperature
- IACV (Idle Air Control Valve): controls the engine idle speed and enhances the start-up ability

This throttle body is undecomposable because it is precisely adjusted in the factory preset.



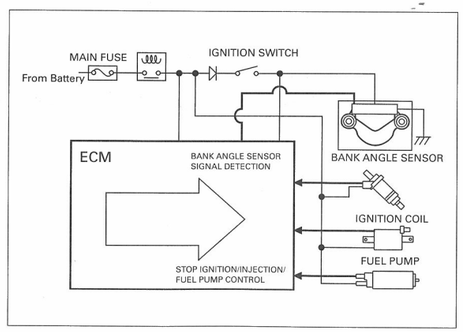


BANK ANGLE SENSOR

The bank angle sensor detects excessive bank angle and interrupts the ignition/fuel system control. The conventional bank angle sensor system controls the power source supply for the injector, ignition coil and fuel pump directly through the engine stop relay. This bank angle sensor sends out the signal of bank angle status to the ECM, then the ECM stops to control the ignition/fuel system.

FAIL-SAFE FUNCTION OF OVERHEAT

When the coolant temperature exceeds 120°C (248°F), the ECM detects as overheated engine and controls the fuel injection to reduce the engine speed below 5,000 min^{-1} (rpm), at the same time, the coolant temperature indicator turns on. The ECM also controls as overheated engine even incase of the ECT sensor failure.



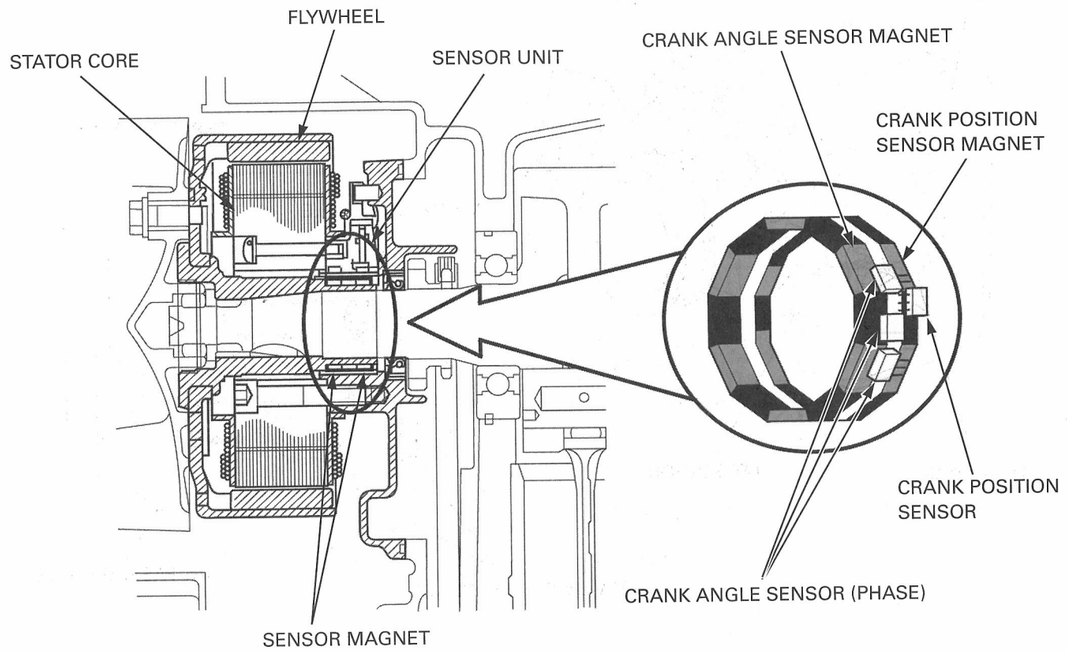
ENGINE MANAGEMENT SYSTEM

This scooter is equipped with the combined alternator/starter and the regulator/rectifier integrated ECM (Engine Control Module) that controls the PGM-FI, charging, ignition and electric starter system.

The alternator/starter functions as the AC generator, starter motor and CKP sensor. This component uses no brush, resulting in a compact, light and maintenance-free. This alternator/starter unit consists of the flywheel with sensor magnet and stator with position sensors.

The ECM adjusts current to the stator coil to turn the flywheel when starting, and to increase charging current under 3,500 min^{-1} (rpm) to enhance charging capability.

The flywheel is designed with inner magnets integrated in the rotor core. The stator is designed with 3 crankshaft angle (phase) sensors and Crankshaft Position sensor. These sensors are hall IC type.

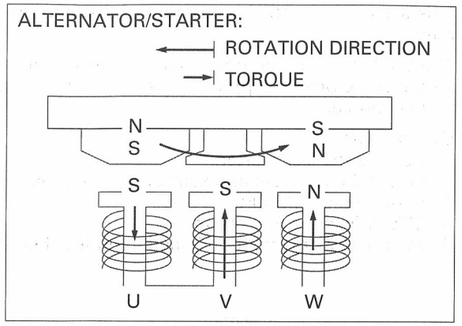


CHARGING SYSTEM

This brush-less alternator/starter operates as a 3-phase AC generator.

When functioning as an alternator, the magnetic flux from the magnet passes through the rotor core, reducing the magnetic force to allow low-friction spinning of the alternator/starter.

A volts alternating current is output to the regulator/rectifier integrated in the ECM.

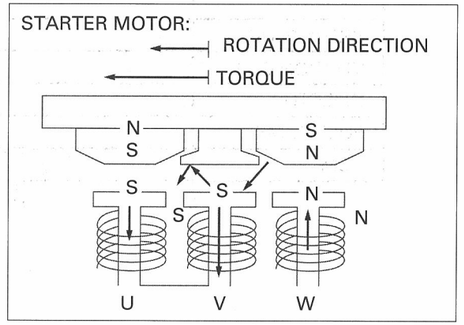


ELECTRIC STARTER SYSTEM

The alternator/starter also functions as a starter motor by applying current to the stator coil from the ECM to turn the flywheel.

The 3 crankshaft angle sensors are attached to the stator to detect crankshaft angle phase. Signals from a magnet that is integrated in the outer circumference of the flywheel boss are received by the sensor and sent to the ECM.

When functioning as a starter motor, the magnetic flux occurs from the magnet and from the rotor core due to the strong motor drive current, multiplying the magnetic force and providing a high torque from the alternator/starter.



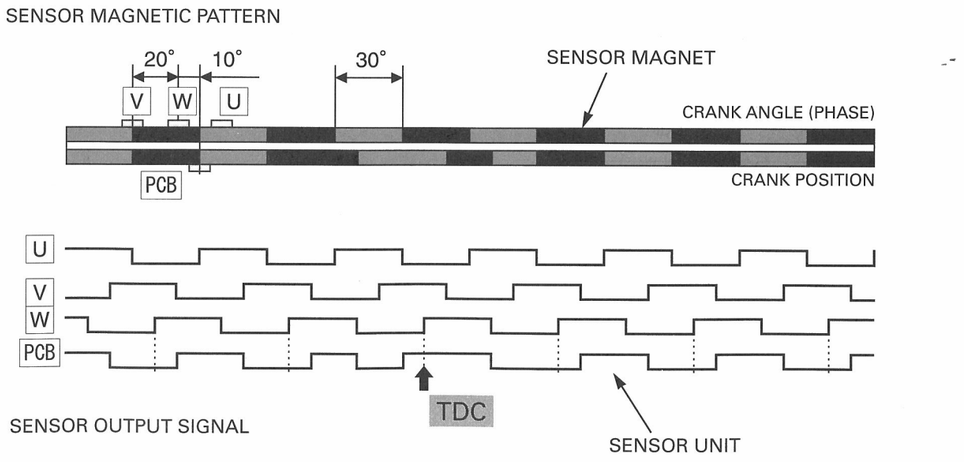
IGNITION/FUEL INJECTION TIMING CONTROL

This system uses the CKP sensor (phase PCB) along with the crankshaft angle sensor (phase W) so as to detect the reference position of crankshaft (Top Dead Centre).

The ECM recognizes the position of TDC as following timing.

- At the moment of the phase W signal picking up even when the phase PCB signal is high.

If the problem occurs at 3crankshaft angle (phase U, V and W) sensors and CKP sensor (phase PCB), the ECM stops to control the ignition/fuel system as fail-safe function as well as the conventional type CKP sensor.

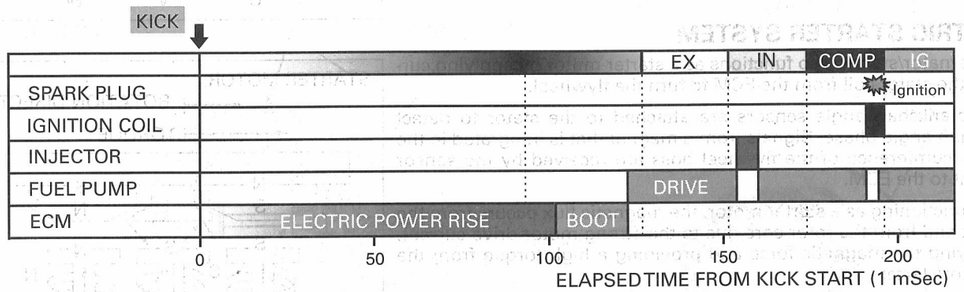


STARTING CONTROL FOR KICK STARTER

This system is for the securement of the starting ability by kick starter when an emergency arises (e.g.: low battery voltage).

The ECM is booted up immediately after kick starting then controls the fuel pump, injector and ignition coil with a generated electric power supply. This series of functions capacitate to start the engine by kick starter with insufficient electric power source.

OPERATION
1. Operate the kick starter.
2. Rotate the flywheel and start to generate electric power.
3. Boot up the ECM/CPU.
4. ECM drives the fuel pump.
5. ECM detects the ignition/injection timing then starts the engine.

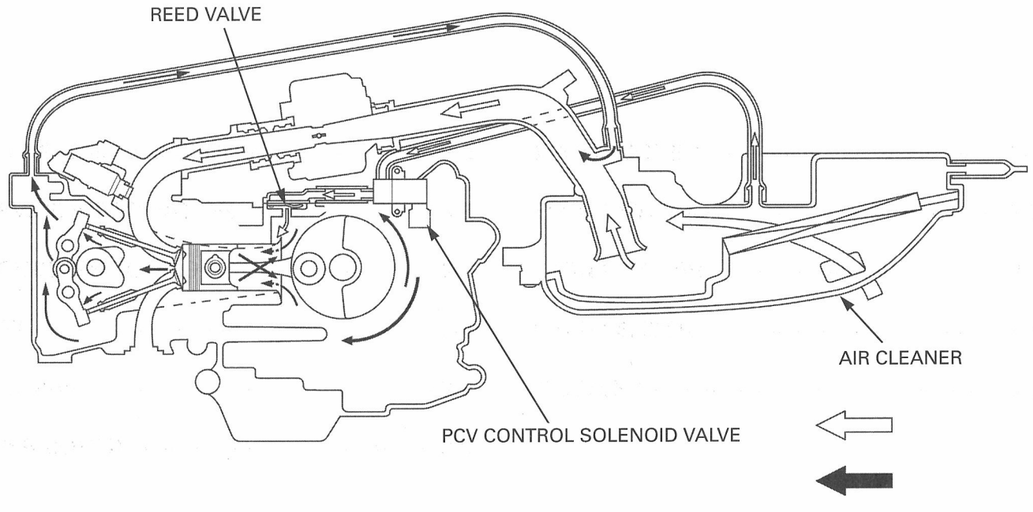


PCV (Positive Crankcase Ventilation)

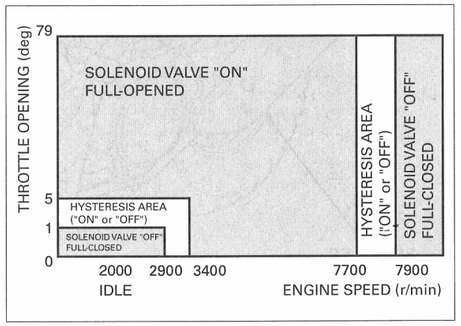
This system allows to ventilate in the crankcase according to inject the air. To ventilate in the crankcase prevents the stagnant blow-by gas that contains gasoline or water vapor and allows for keeping the performance of engine oil under the driving condition with low engine oil temperature.

The PCV system consists of the air cleaner, solenoid valve and lead valve.

The lead valve prevents to re-flow the blow-by gas to the air cleaner case. The solenoid valve secures the engine idle speed by control the air mass flow depending on the throttle opening and engine speed.



1. The ECM control to choke airflow with the solenoid valve so as to keep the stable idle speed.
2. When increase the throttle opening and engine speed, the ECM control to open the solenoid valve so to ventilate in the crankcase.



MEMO

3. FRAME/BODY PANELS/EXHAUST SYSTEM

BODY PANEL LOCATIONS 3-2

SERVICE INFORMATION 3-3

TROUBLESHOOTING 3-3

SEAT 3-4

SEAT RAIL 3-5

INNER COVER 3-5

FRONT COVER 3-6

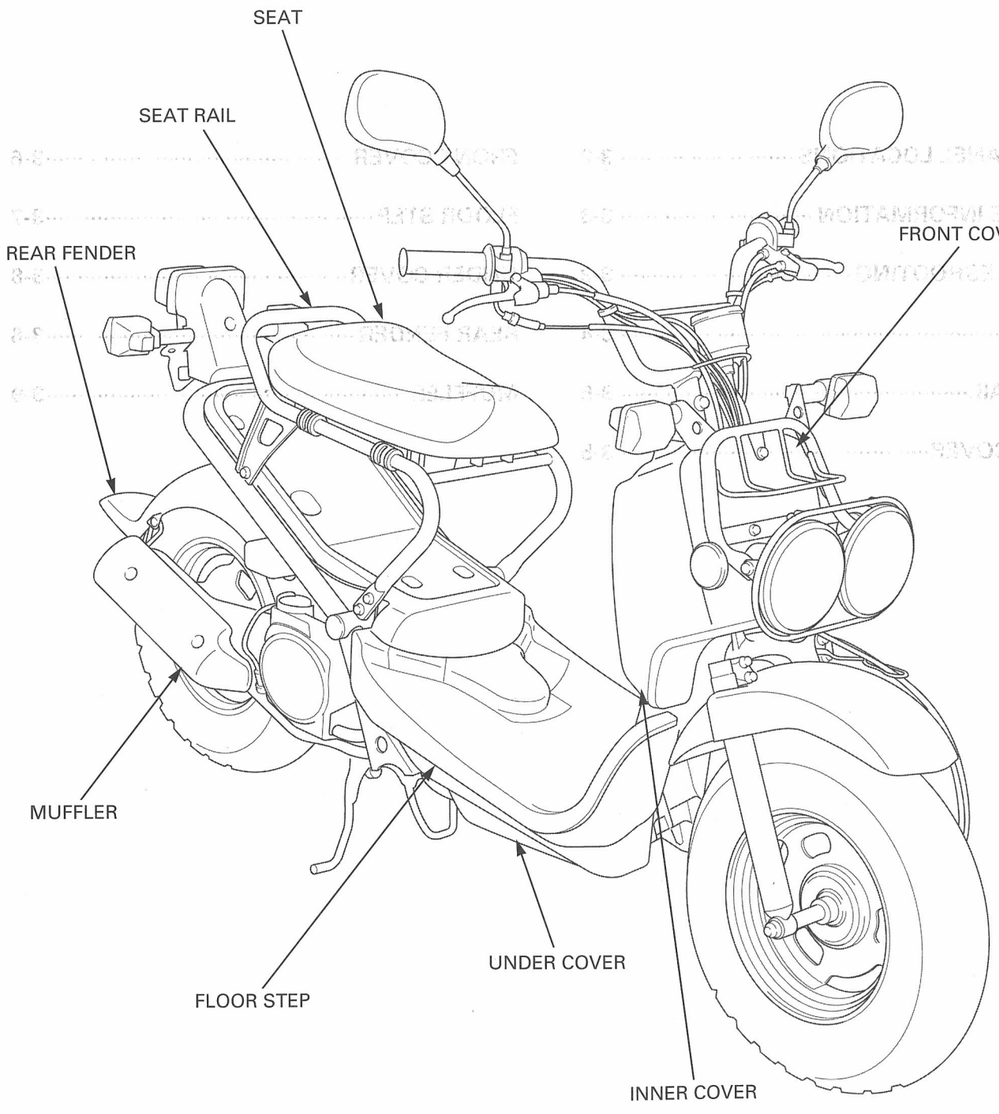
FLOOR STEP 3-7

UNDER COVER 3-8

REAR FENDER 3-8

MUFFLER 3-9

BODY PANEL LOCATIONS



SERVICE INFORMATION

GENERAL

- This section covers removal and installation of the body panels, exhaust system and seat rail.
- Always replace the exhaust pipe gasket with a new one after loosening or removing the exhaust pipe joint nuts.
- When installing the exhaust system, loosely install all of the muffler fasteners. Always tighten the exhaust joint first, then tighten the mounting fasteners. If you tighten the mounting fasteners first, the exhaust pipe may not seat properly.
- Always inspect the exhaust system for leaks after installation.

TORQUE VALUES

Muffler protector bolt	5.2 N·m (0.52 kgf·m, 3.8 lbf·ft)

TROUBLESHOOTING

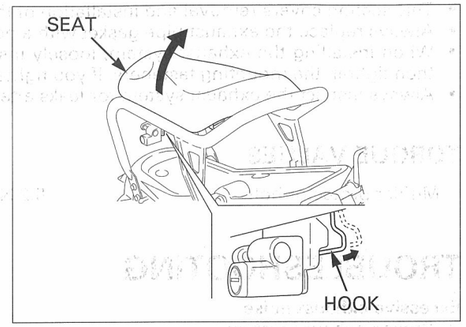
Excessive exhaust noise
- Broken exhaust system
- Exhaust gas leak

Poor performance
- Deformed exhaust system
- Exhaust gas leak
- Clogged muffler

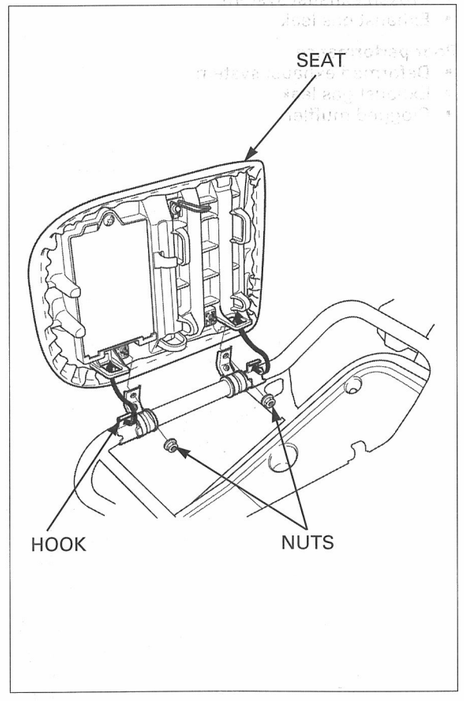
SEAT

REMOVAL

Open the seat by unhooking the seat hook.



Remove the two nuts and seat.

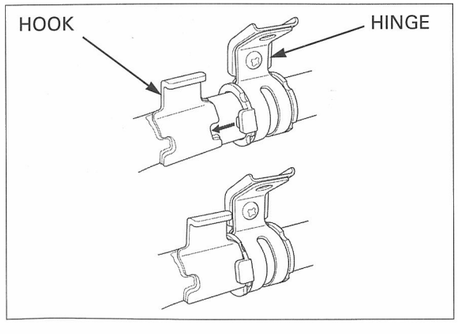


INSTALLATION

Install the seat to the frame hooks and seat hinges by aligning the seat hinge tabs with the frame hook grooves as shown.

Tighten the nuts securely.

Close the seat.

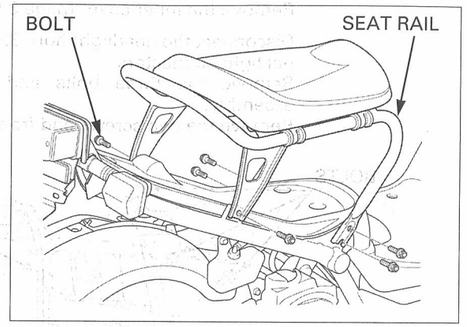


SEAT RAIL

REMOVAL/INSTALLATION

Remove the six bolts and seat rail.

Installation is in the reverse order of removal.



INNER COVER

Be careful not to damage the tabs, slots and wires.

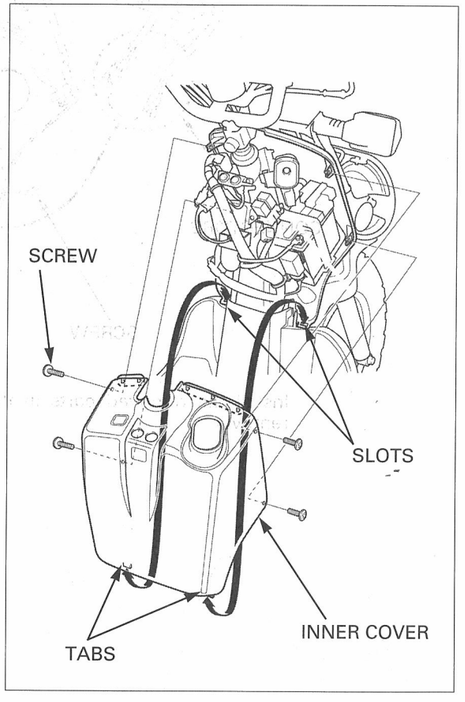
REMOVAL

Remove the four screws and inner cover.

INSTALLATION

Install the inner cover to the front cover by aligning the inner cover tabs with the front cover slots.

Tighten the four screws.

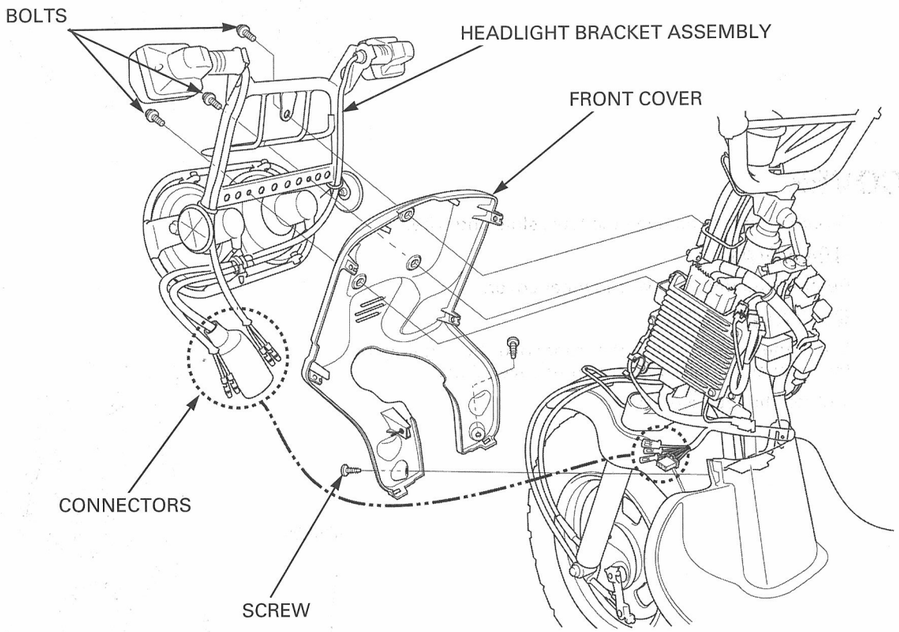


FRONT COVER

REMOVAL/INSTALLATION

Remove the inner cover (page 3-5).

Disconnect the headlight/horn 3P (Red) and turn signal light connectors.
Remove the three bolts and headlight bracket assembly.
Remove the two screws and front cover.



Install the removed parts in the reverse order of removal.

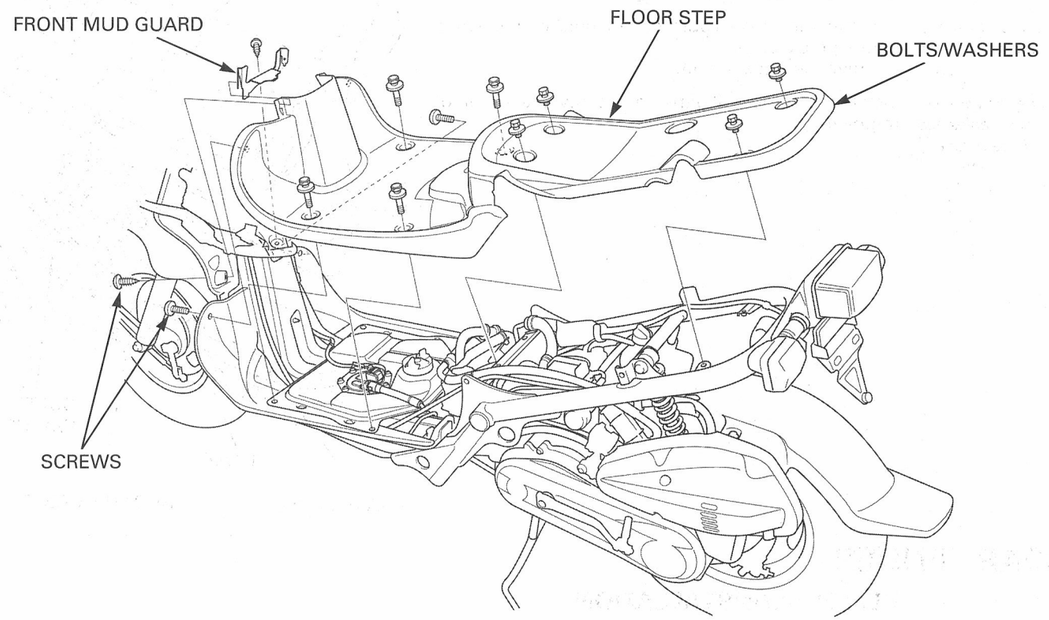
FLOOR STEP

REMOVAL

Remove the following:

- Seat rail (page 3-5).
- Inner cover (page 3-5).

Remove the front mud guard.
Remove the four screws, eight bolts/washers and floor step.



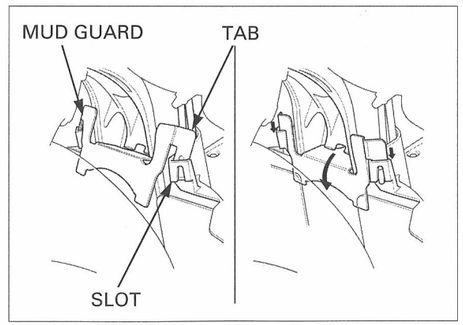
INSTALLATION

Be careful not to damage the wires, cables and hoses.

Install the floor step onto the frame.
Install and tighten the eight bolts/washers and four screws.

Be careful not to deform the front mud guard.

Install the front mud guard by aligning its tabs with the floor step slots as shown.



Install the following:

- Inner cover(page 3-5).
- Seat rail (page 3-5).

UNDER COVER

REMOVAL/INSTALLATION

Remove the following:

- Floor step (page 3-7).
- Fuel tank (page 6-52).

Release the main wire harness and throttle cable from the guide of the under cover.

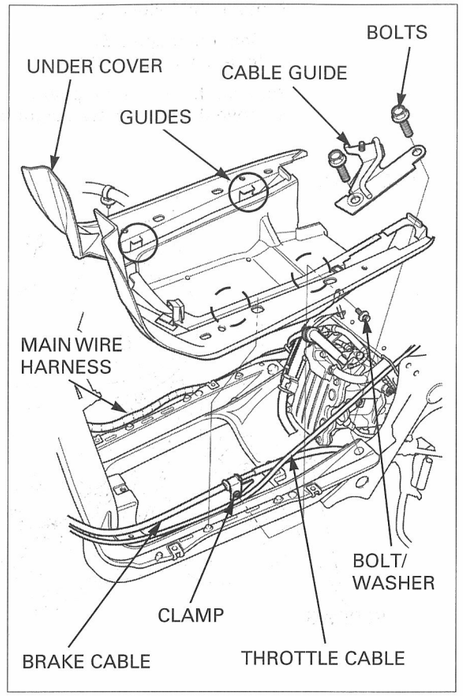
Remove the bolts and cable guide.

Be careful not to damage the brake cable.

Remove the brake cable clamp bolt/washer while holding the clamp.
Remove the under cover.

Route the wire harness, cables and hoses properly (page 1-15).

Install the removed parts in the reverse order of removal.

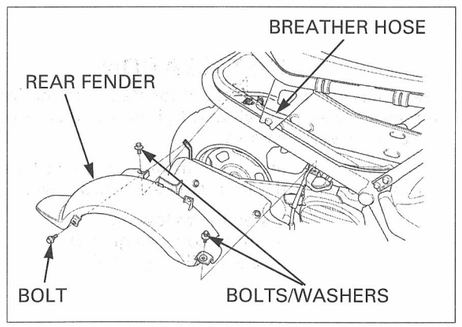


REAR FENDER

REMOVAL/INSTALLATION

Release the crankcase breather hose from the clamp.
Remove the bolt, bolts/washers and rear fender.

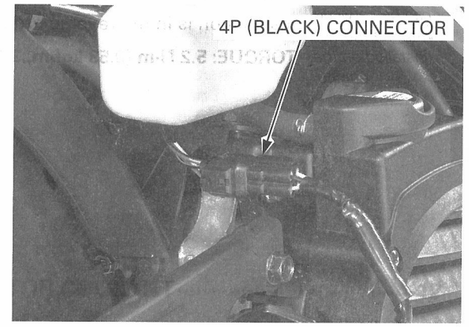
Installation is in the reverse order of removal.



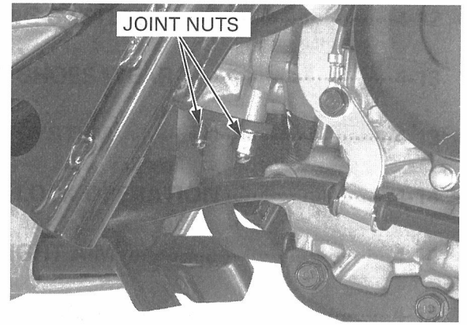
MUFFLER

REMOVAL

Disconnect the O_2 sensor 4P (Black) connector.

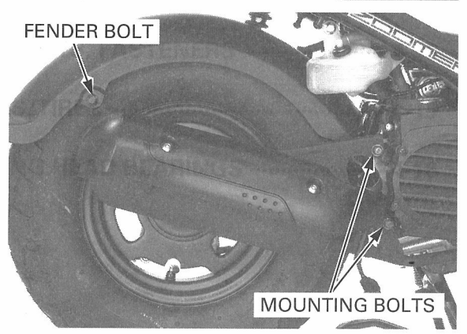


Remove the two exhaust pipe joint nuts.



Remove the rear fender bolt, two muffler mounting bolts and muffler.

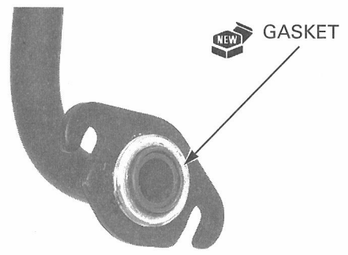
Remove the gasket.



INSTALLATION

Replace the gasket with a new one.

Installation is in the reverse order of removal.



MUFFLER PROTECTOR

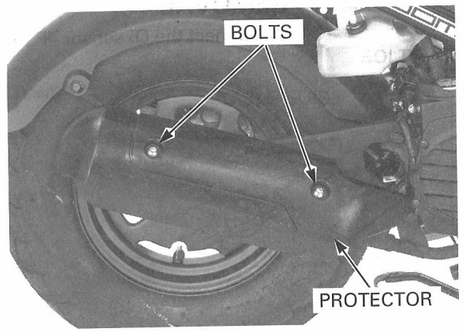
REMOVAL/INSTALLATION

The muffler protector can be serviced with the muffler installed on the engine.

Remove the socket bolts and muffler protector.

Installation is in the reverse order of removal.

TORQUE: 5.2 N·m (0.53 kgf·m, 3.1 lbf·ft)



4. MAINTENANCE

SERVICE INFORMATION 4-2
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RADIATOR COOLANT 4-12
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BRAKE SHOES WEAR 4-13
BRAKE SYSTEM 4-13
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SUSPENSION 4-14
NUTS, BOLTS, FASTENERS 4-15
WHEELS/TIRES 4-15
STEERING HEAD BEARINGS 4-16

SERVICE INFORMATION

GENERAL

- Place the motorcycle on a level ground surface before starting any work.
- Gasoline is extremely flammable and is explosive under certain conditions.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where the gasoline is stored can cause a fire or explosion.
- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in an enclosed area.
- The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.

SPECIFICATIONS

ITEM			SPECIFICATIONS
Throttle grip free play			2 – 6 mm (1/16 – 1/4 in)
Spark plug			NGK
	Standard		ER8EH-N
Spark plug gap			0.60 – 0.70 mm (0.024 – 0.028 in)
Valve clearance	IN		0.10 ±0.03 mm (0.004 ±0.001 in)
	EX		0.21 ±0.03 mm (0.008 ±0.001 in)
Engine oil capacity	After draining		0.6 liter (0.6 US qt, 0.5 Imp qt)
	At disassembly		0.7 liter (0.7 US qt, 0.6 Imp qt)
Recommended engine oil			Honda "4-STROKE MOTORCYCLE OIL" or equivalent API service classification: SJ except oils labeled as energy conserving the circular API service label Viscosity: SAE 10W-30 (Use 10W-30 regardless of atmospheric temperature) JASO: MA or MB
Engine idle speed			2,000 ±100 min^{-1} (rpm)
Brake lever free play		Front	10 – 20 mm (3/8 – 13/16 in)
		Rear	10 – 20 mm (3/8 – 13/16 in)
Tire size		Front	120/90-10 57J
		Rear	130/90-10 61J
Cold tire pressure		Front	175 kPa (1.75 kgf/cm^2, 25 psi)
		Rear	175 kPa (1.75 kgf/cm^2, 25 psi)
Minimum tire tread depth		Front	0.8 mm (0.03 in)
		Rear	0.8 mm (0.03 in)

TORQUE VALUES

Spark plug	8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)
Engine oil drain bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)
Engine oil strainer cap	20 N·m (2.0 kgf·m, 14 lbf·ft)

TOOLS

Spark plug wrench
070MA-GEZ0100



MAINTENANCE SCHEDULE

Perform the Pre-ride inspection in the Owner's Manual at each scheduled maintenance period.

I: Inspect and Clean, Adjust, Lubricate or Replace if necessary. C: Clean. R: Replace. A: Adjust. L: Lubricate.

The following items require some mechanical knowledge. Certain items (particularly those marked * and **) may require more technical information and tools. Consult an authorized Honda dealer.

	ITEMS / FREQUENCY	WHICHEVER COMES FIRST ⇩	ODOMETER READING (NOTE 1) ⇨					REFER TO PAGE
			X1,000 mi	0.6	2.5	5	7.5	
			X1,000 km	1	4	8	12	
			Month		6	12	18	
*	FUEL LINE						I	4-4
*	THROTTLE OPERATION				I	I	I	4-4
	AIR CLEANER	NOTE 2					R	4-5
	CRANKCASE BREATHER	NOTE 3			C	C	C	4-6
*	SPARK PLUG					R		4-6
*	VALVE CLEARANCE		EVERY 15,000 mi (24,000 km) I					4-8
	ENGINE OIL			R	R	R	R	4-10
*	ENGINE OIL STRAINER SCREEN						C	4-11
	RADIATOR COOLANT	NOTE 4						4-12
*	COOLING SYSTEM						I	4-12
	BRAKE SHOES WEAR				I	I	I	4-13
	BRAKE SYSTEM			I	I	I	I	4-13
*	BRAKE LOCK OPERATION			I	I	I	I	4-14
*	HEADLIGHT AIM				I	I	I	4-14
**	CLUTCH SHOES WEAR					I		10-14
*	SUSPENSION				I	I	I	4-14
*	NUTS, BOLTS, FASTENERS			I		I		4-15
**	WHEELS/TIRES				I	I	I	4-15
**	STEERING HEAD BEARINGS			I			I	4-16

* Should be serviced by an authorized Honda dealer, unless the owner has proper tools and service data and is mechanically qualified.

** In the interest of safety, we recommend these items be serviced only by an authorized Honda dealer.

Honda recommends that an authorized Honda dealer should road test your motorcycle after each periodic maintenance is carried out.

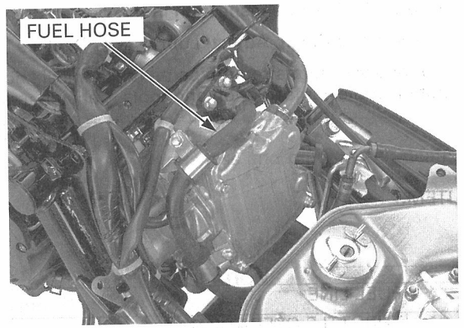
NOTES:
1. At higher odometer reading, repeat at the frequency intervals established here.
2. Service more frequently when riding in unusually wet or dusty areas.
3. Service more frequently when riding in rain or at full throttle.
4. Replace every 2 years. Replacement requires mechanical skill.

FUEL LINE

Remove the floor step (page 3-7).

Check the fuel lines for deterioration, damage or leakage.

Replace the fuel lines if necessary.



THROTTLE OPERATION

Check the throttle cable for any deterioration or damage.
Check that the throttle opens smoothly and automatically closes completely in all steering positions.

If the throttle grip does not return properly, lubricate the throttle cable and overhaul and lubricate the throttle grip housing.
For cable lubrication: Disconnect the throttle cable at its upper end. Thoroughly lubricate the cable and its pivot point with a commercially available cable lubricant or a light weight oil.

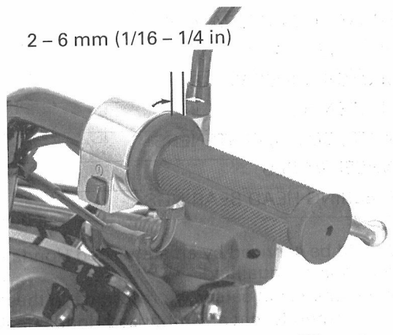
Reusing a damaged or abnormally bent or kinked throttle cable can prevent proper throttle slide operation and may lead to a loss of throttle control while riding.

If the throttle grip still does not return properly, replace the throttle cable.

With the engine idling, turn the handlebar all the way to the right and left to ensure that the idle speed does not change. If idle speed increases, check the throttle grip free play and throttle cable connection.

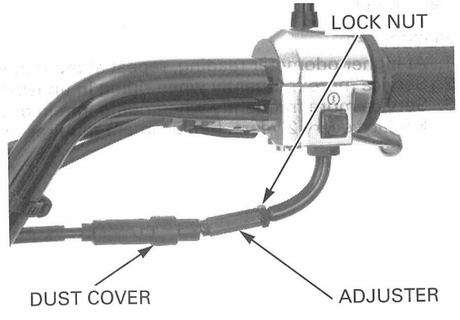
Measure the throttle grip free play at the throttle grip flange.

FREE PLAY: 2 – 6 mm (1/16 – 1/4 in)



Throttle grip free play can be adjusted at either end of the throttle cable.
Minor adjustment is made with the upper adjuster.

Remove the dust cover.
Loosen the lock nut, turn the adjuster as required and tighten the lock nut.

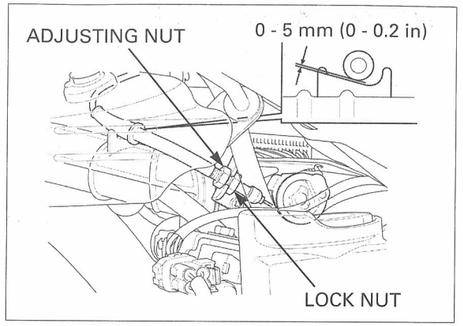


Major adjustment is made with the lower adjuster.

Loosen the lock nut, turn the adjusting nut as required and tighten the lock nut while the throttle cable against to the connecting hose.

Check the clearance between the throttle cable and connecting hose is 0 - 5 mm (0 - 0.2 in).

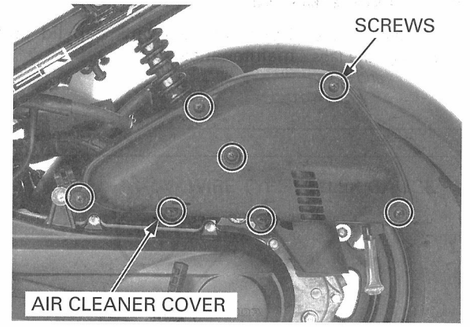
Recheck the throttle operation.



AIR CLEANER

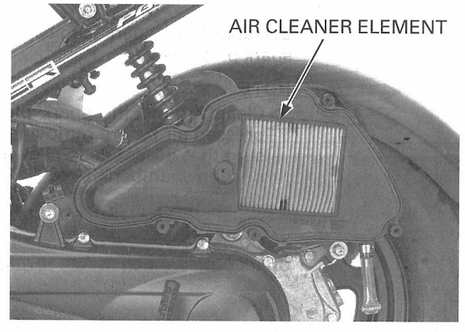
NOTE:
- The viscous paper element type air cleaner cannot be cleaned because the element contains a dust adhesive.
- If the scooter is used in unusually wet or dusty areas, more frequent inspections are required.

Remove the seven screws and air cleaner cover.



Replace the element in accordance with the maintenance schedule or any time it is excessively dirty or damaged.

Install a new air cleaner element, cover and tighten the screws.

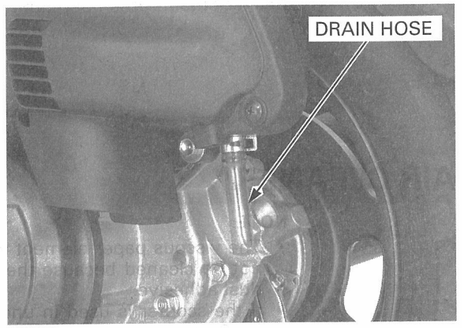


ENGINE BREATHER

NOTE:

- Service more frequently when ridden in rain, at full throttle, or after the motorcycle is washed or overturned. Service if the deposit level can be seen in the transparent section of the drain hose.

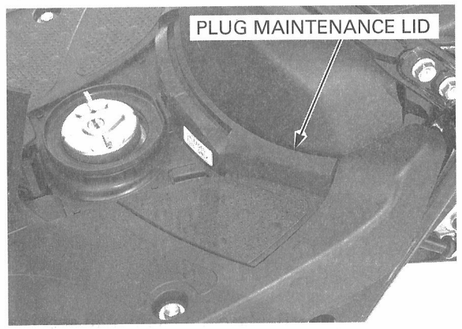
Remove the engine breather drain hose and drain deposits into a suitable container, then install the engine breather drain hose securely.



SPARK PLUG

Be careful not to damage the tabs and slots.

Open the fuel tank cap lid and remove the plug maintenance lid.



Disconnect the spark plug cap and clean around the spark plug bases.

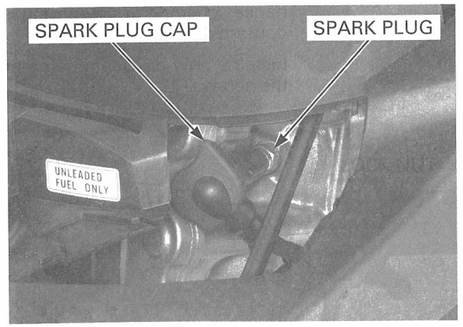
NOTE:

- Clean around the spark plug bases with compressed air before removing the plug, and make sure that no debris is allowed to enter the combustion chamber.

Remove the spark plug using special tool.

TOOL:

Spark plug wrench	**070MA-GEZ0100**

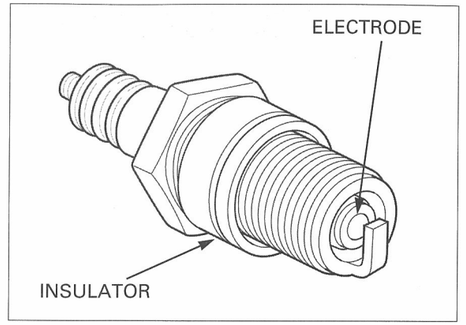


Check the following and replace if necessary (recommended spark plug: page 4-2).

- Insulator for damage
- Electrodes for wear
- Burning condition, coloration

This motorcycle's spark plug equipped with iridium center electrode. Replace the spark plug if the electrodes is contaminated.

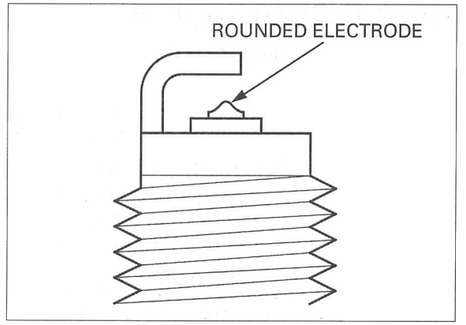
If the electrodes is contaminated with accumulated objects or dirt, replace the spark plug.



Replace the plug if the center electrode is rounded as shown in the illustration.
If necessary, adjust the gap by bending the side electrode carefully.

Always use specified spark plug on this motorcycle.

SPECIFIED SPARK PLUG:
Standard:
ER8EH-N (NGK)



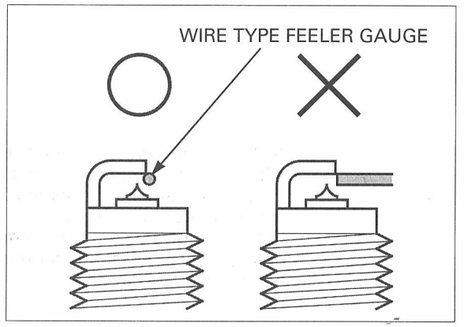
To prevent damaging the iridium center electrode, use a wire type feeler gauge to check the spark plug gap.

Check the gap between the center and side electrodes with a wire type feeler gauge.

Make sure that the ϕ 0.8 mm (0.03 in) plug gauge does not insert between the gap.

Do not adjust the spark plug gap. If the gap is out of specification, replace with a new one.

If the gauge can be inserted into the gap, replace the plug with a new one.



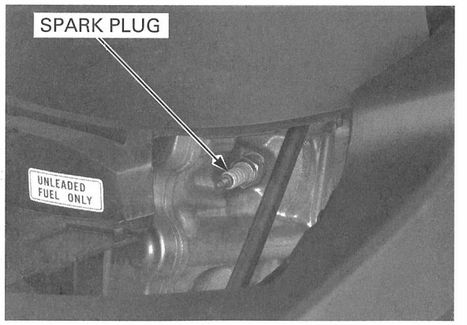
Install the spark plug to the cylinder head and hand tighten, then torque to specification.

TOOL:

Spark plug wrench	**070MA-GEZ0100**

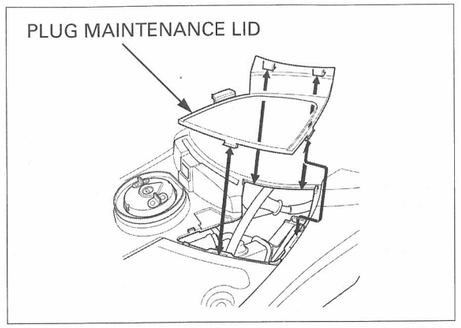
TORQUE: 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)

Install the spark plug cap.



Be careful not to damage the tabs and slots.

Install the plug maintenance lid.
Close the fuel tank cap lid.



VALVE CLEARANCE

INSPECTION

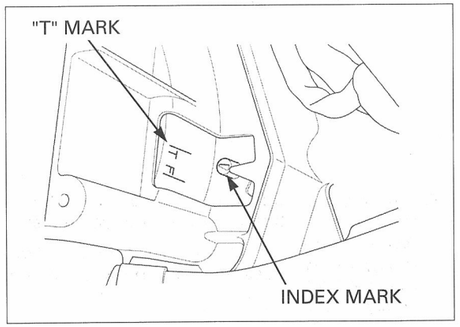
NOTE:

- Inspect and adjust the valve clearance while the engine is cold (below 35° C/95° F).

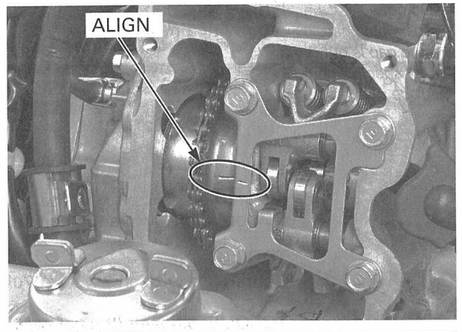
Remove the following:

- Radiator cover (page 7-7)
- Belt case cover (page 10-6)
- Cylinder head cover (page 9-6)

Rotate the drive pulley (crankshaft) counterclockwise and align the "T" mark on the flywheel with the index mark on the crankcase.

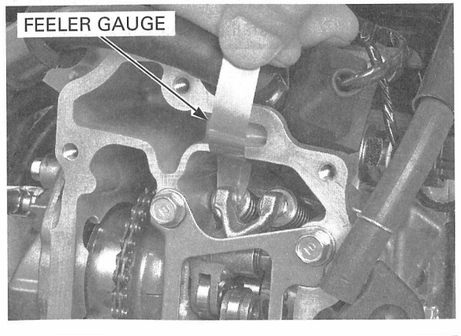


Make sure the index line on the cam sprocket aligns with the index mark on the stopper plate and the lobe of the camshaft faces the cylinder side (TDC on the compression stroke).
If the lobe of the camshaft is not aligned, rotate the drive pulley (crankshaft) counterclockwise one revolution and realign the index line with the index mark.



Measure the valve clearance by inserting a feeler gauge between the rocker arm and shim.

VALVE CLEARANCE:
IN: 0.10 ±0.03 mm (0.004 ±0.001 in)
EX: 0.21 ±0.03 mm (0.008 ±0.001 in)



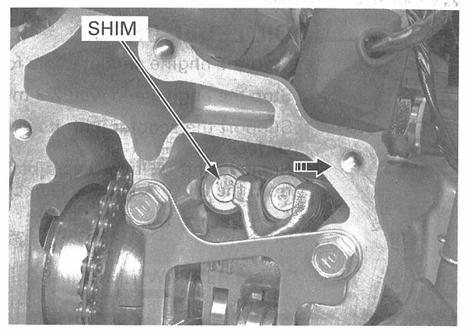
ADJUSTMENT

Move the rocker arm to the spring side and remove the shim.

NOTE:

- Do not allow the shims to fall into the crankcase.
- Mark all shims to ensure correct reassembly in their original locations.
- The shims can be easily removed with tweezers or a magnet.

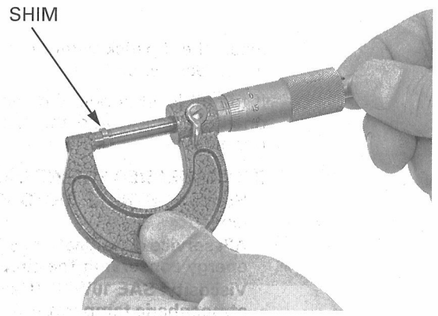
Clean the valve shim contact area with compressed air.



Measure the shim thickness and record it.

NOTE:

- Sixty-nine different shim thicknesses are available in increments of 0.025 mm (from 1.200 mm to 2.900 mm).

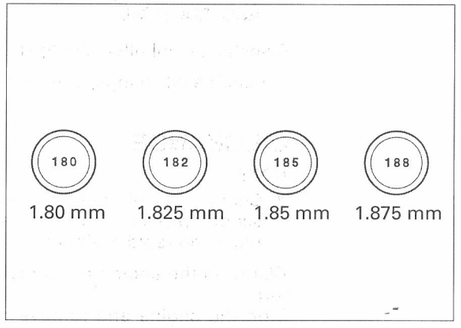


Calculate the new shim thickness using the equation below.

A = (B – C) + D

A: New shim thickness
B: Recorded valve clearance
C: Specified valve clearance
D: Old shim thickness

- Make sure of the correct shim thickness by measuring the shim with a micrometer.
- Reface the valve seat if carbon deposits result in a calculated dimension of over 2.900 mm.

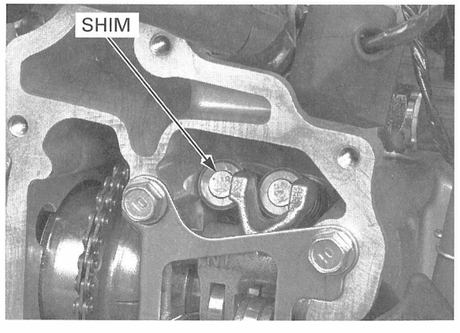


Install the newly selected shim on the spring retainer.

Rotate the camshaft by rotating the drive pulley (crankshaft) counterclockwise several times.
Recheck the valve clearance.

Install the following:

- Cylinder head cover (page 9-23)
- Belt case cover (page 10-6)
- Radiator cover (page 7-8)



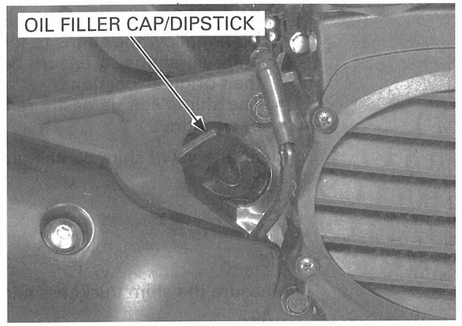
ENGINE OIL

OIL LEVEL CHECK

Start the engine and let it idle for 3-5 minutes.

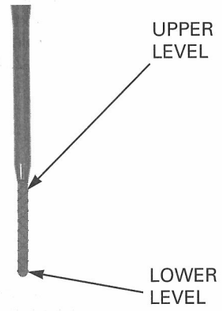
Stop the engine and wait 2-3 minutes.

Support the scooter with its center stand on a level surface.
Remove the oil filler cap/dipstick and wipe the oil from the dipstick with a clean cloth.



Insert the dipstick without screwing it in, remove it and check the oil level.

If the oil level is below or near the lower level line on the dipstick, add the recommended oil to the upper level.



RECOMMENDED ENGINE OIL:
Honda "4-STROKE MOTORCYCLE OIL" or equivalent
API service classification: SJ except oils labeled as energy conserving the circular API service label
Viscosity: SAE 10W-30 (Use 10W-30 regardless of atmospheric temperature)
JASO: MA or MB

Reinstall the oil filler cap/dipstick.

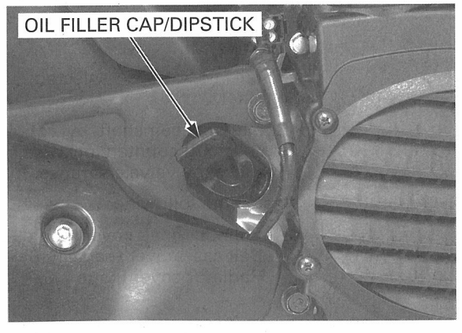
For engine oil change, page 4-10.

OIL CHANGE

NOTE:

- Change the oil with the engine warm and the scooter placed on its center stand to assure complete and rapid draining.

Warm up the engine to normal operating temperature.
Stop the engine and remove the oil filler cap/dipstick.



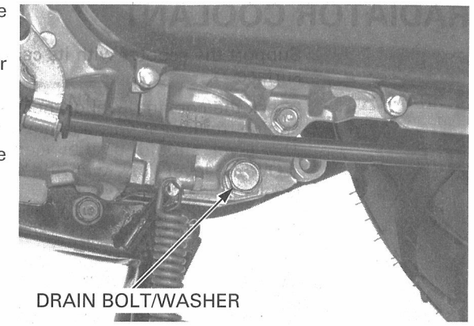
Remove the drain bolt and washer, and drain the oil.

Install the oil drain bolt with a new sealing washer and tighten it to the specified torque.

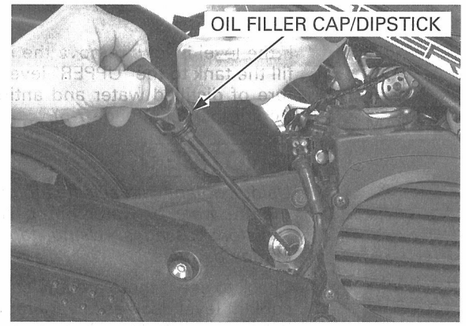
TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Fill the crankcase with the recommended oil (page 4-10).

OIL CAPACITY:
0.6 liter (0.6 US qt, 0.5 Imp qt) at draining
0.7 liter (0.7 US qt, 0.6 Imp qt) at disassembly



Check the engine oil level (page 4-10).
Install the oil filler cap/dipstick.
Make sure there are no oil leakage.



ENGINE OIL STRAINER SCREEN

Drain the engine oil (page 4-10).

Remove the oil strainer cap and O-ring.

Remove the spring and oil strainer screen.

Clean the oil strainer screen.

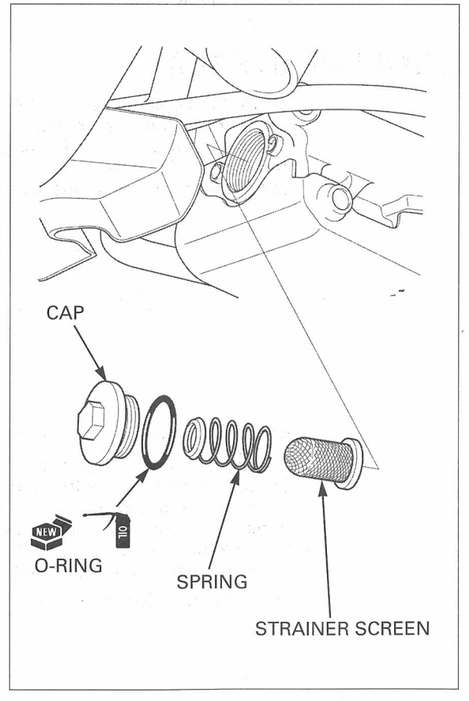
Coat a new O-ring with engine oil.

Install the oil strainer screen and spring into the crankcase as shown.

Install and tighten the oil strainer cap with a new O-ring.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

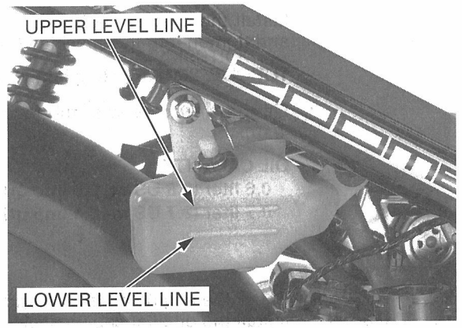
Fill the crankcase with the recommended engine oil (page 4-10).



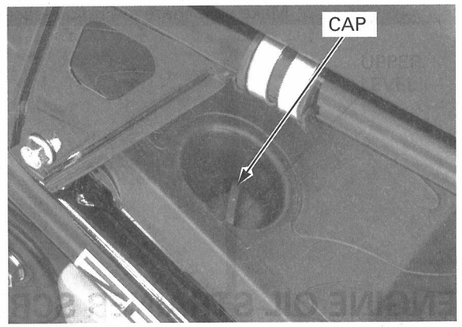
RADIATOR COOLANT

Support the scooter with its center stand on a level surface.

Check the coolant level of the reserve tank with the engine running at normal operating temperature.
The level should be between the "UPPER" and "LOWER" level lines with the scooter upright on a level surface.



If the level is low, remove the reserve tank cap and fill the tank to the "UPPER" level line with a 1:1 mixture of distilled water and antifreeze (coolant mixture preparation: page 7-5).



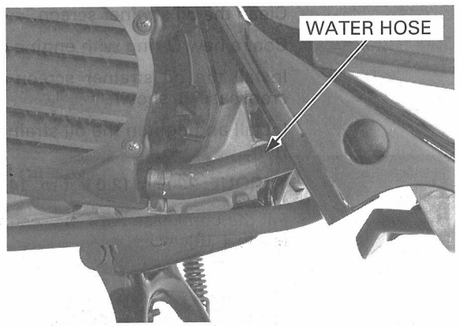
NOTICE

Using coolant with silicate inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

Check to see if there are any coolant leaks when the coolant level decreases very rapidly.
If the reserve tank becomes completely empty, there is the possibility of air getting into the cooling system (page 7-7).

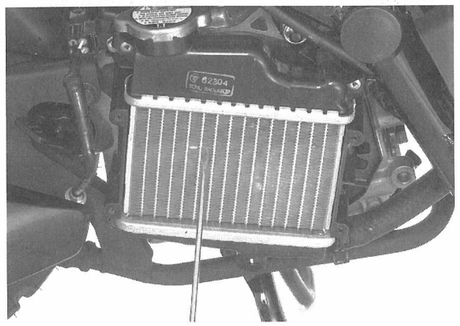
COOLING SYSTEM

Check for coolant leakage from the water pump, water hoses and hose joints.
Check the water hoses for cracks or deterioration and replace if necessary.
Check that all hose clamps are tight.



Remove the radiator cover (page 7-7).

Check the radiator air passage for clogs or damage. Straighten bent fins with a small, flat blade screwdriver and remove insects, mud or other obstructions with compressed air or low pressure water.
Replace the radiator if the air flow is restricted over more than 20% of the radiating surface.



Install the radiator cover (page 7-8).

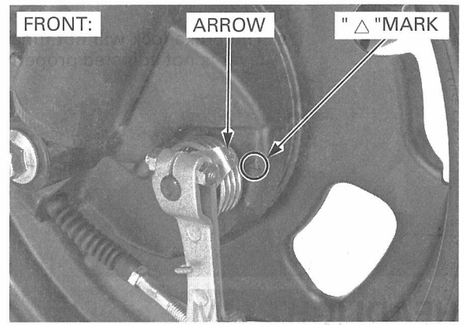
BRAKE SHOES WEAR

FRONT

Check the wear indicator position when the brake lever applied.

If the indicator aligns with the reference mark, inspect the brake drum (page 14-10).

Replace the brake shoes (page 14-10) if the drum I.D. is within the service limit.

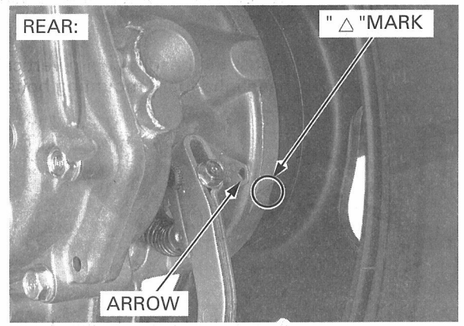


REAR

Check the wear indicator position when the brake lever applied.

If the indicator aligns with the reference mark, inspect the brake drum (page 15-5).

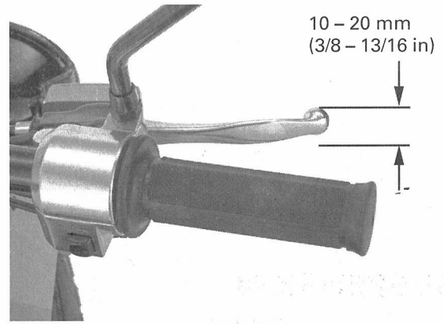
Replace the brake shoes (page 15-5) if the drum I.D. is within the service limit.



BRAKE SYSTEM

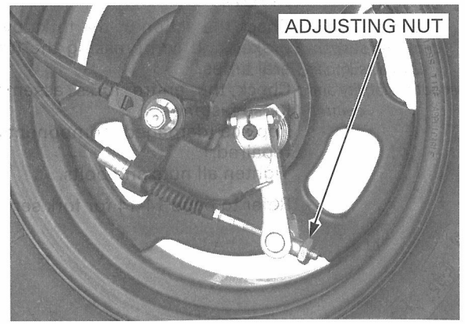
Measure the brake lever free play at the end of the lever.

FREE PLAY: 10 – 20 mm (3/8 – 13/16 in)



Make sure the cut-out on the adjusting nut is seated on the joint pin.

Adjust the brake lever free play by turning the brake arm adjusting nut.

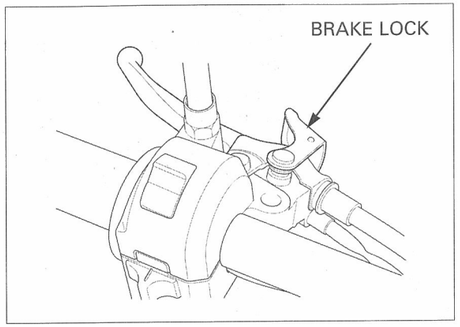


BRAKE LOCK OPERATION

Check the brake lock operation.

NOTE:

- The brake lock will not function if the rear brake lever is not adjusted properly (page 4-13).

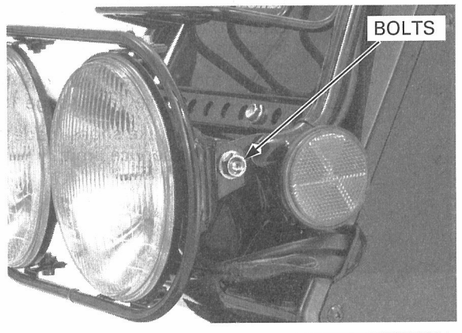


HEADLIGHT AIM

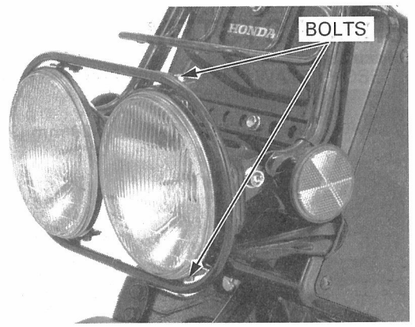
Support the scooter with its center stand on a level surface

Adjust the headlight aim as specified by local laws and regulations.

Adjust the headlight aim vertically by loosening the headlight guard mounting bolts.



Adjust the headlight aim horizontally by loosening the headlight mounting bolts.



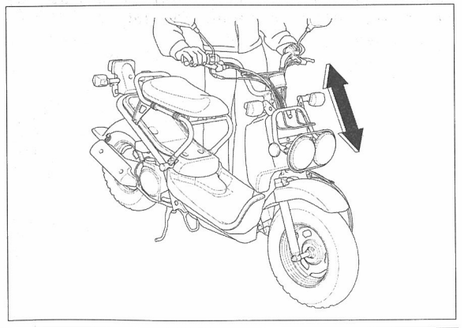
SUSPENSION

FRONT

Loose, worn or damaged suspension parts impair scooter stability and control.

Check the action of the forks by operating the front brakes and compressing the front suspension several times.
Check the entire forks assembly for damage or loose fasteners.
Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.

Refer to page 14-14 for fork service.



REAR

Check the action of the shock absorber by compressing it several times.
Check the entire shock absorber assembly for damage or loose fasteners.
Replace damaged components which cannot be repaired.
Tighten all nuts and bolts.

Refer to page 15-8 for shock absorber service.



Raise the rear wheel off the ground and support the scooter securely.

Check for worn engine mounting bushings by grabbing the rear wheel and attempting to move the wheel side-to-side.

Replace the bushings if any looseness is noted (page 8-4).



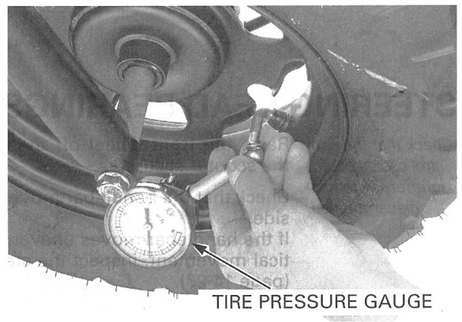
NUTS, BOLTS, FASTENERS

Check that all chassis nuts, bolts and screws are tightened to their correct torque values (page 1-9).
Check that all cotter pins, safety clips, hose clamps and cable stays are in place and properly secured.

WHEELS/TIRES

Check the tire pressure with a tire pressure gauge when the tires are cold.

RECOMMENDED TIRE PRESSURE:
FRONT: 175 kPa (1.75 kgf/cm², 25 psi)
REAR: 175 kPa (1.75 kgf/cm², 25 psi)



Check the tires for cuts, embedded nails or other damage.
Check the front wheel and rear wheel for trueness (refer to page 14-7 and page 15-4).

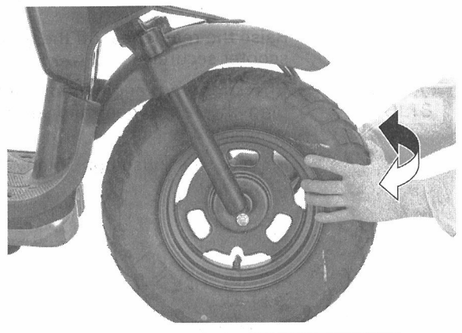


Measure the tread depth at the center of the tires.
Replace the tires when the tread depth reaches the following limits.

MINIMUM TREAD DEPTH:
FRONT: 0.8 mm (0.03 in)
REAR: 0.8 mm (0.03 in)

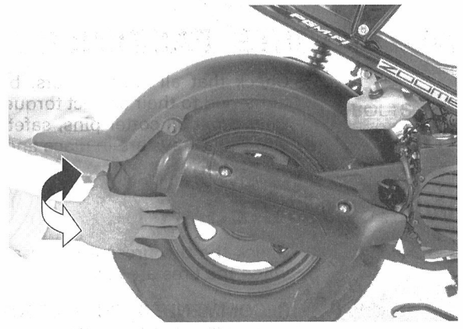
Raise the wheel off the ground and support the scooter securely.

Check for worn wheel bearings by grabbing the wheel and attempting to move the wheel side to side.
Replace the bearings if any looseness is noted.



Refer to front wheel bearing replacement (page 14-7).

Refer to rear final gear shaft bearing replacement (page 11-9).

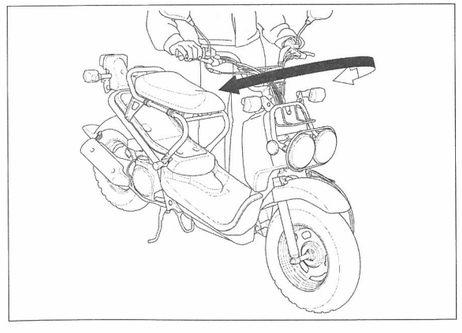


STEERING HEAD BEARINGS

Check that the control cables do not interfere with handlebar rotation.

Raise the front wheel off the ground and support the scooter securely.

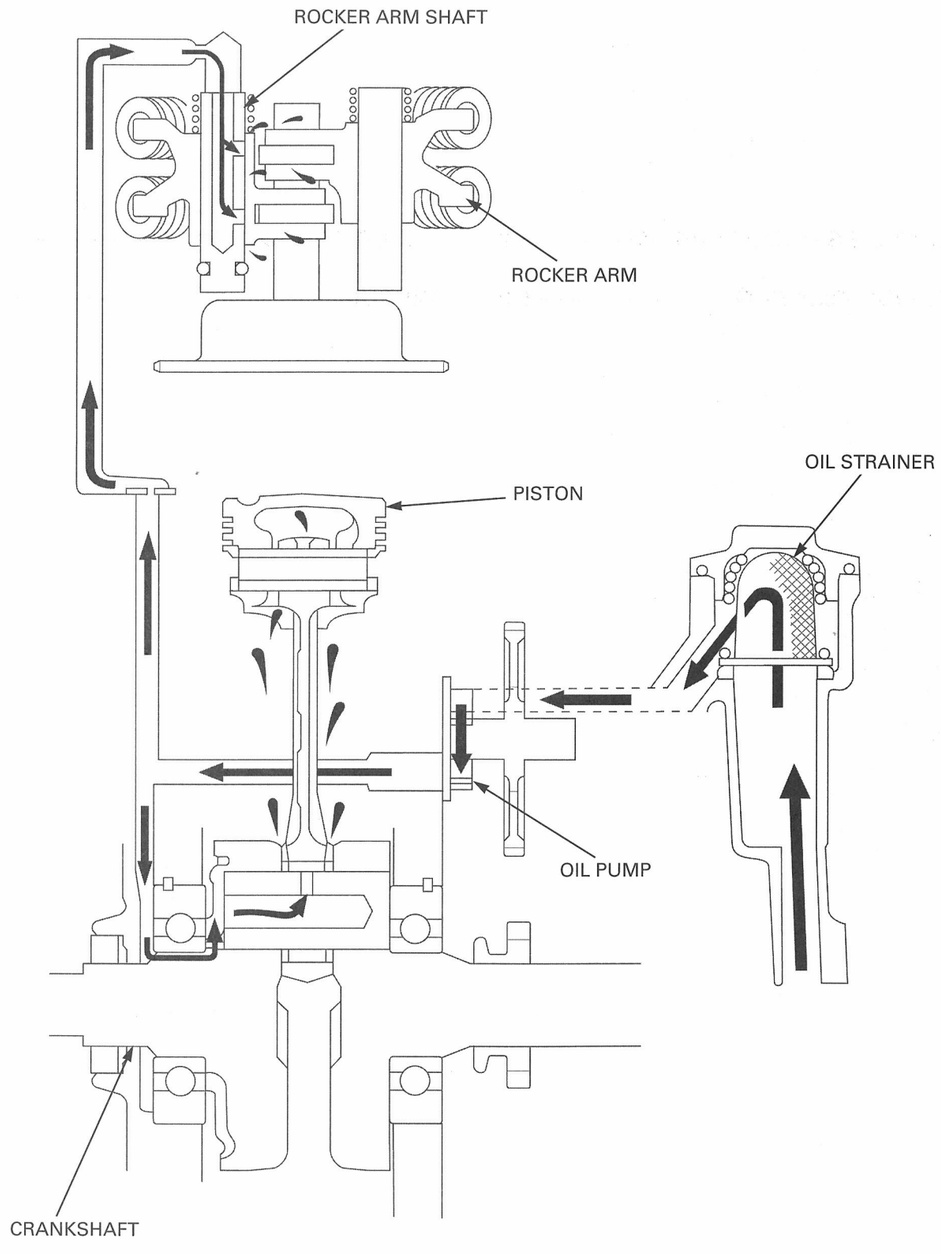
Check that the handlebar moves freely from side-to-side.
If the handlebar moves unevenly, binds, or has vertical movement, inspect the steering head bearings (page 14-23).



5. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM 5-2
SERVICE INFORMATION 5-3
TROUBLESHOOTING 5-3
OIL PUMP 5-4

LUBRICATION SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

⚠ CAUTION

Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

- The oil pump can be serviced with the engine installed in the frame.
- The service procedures in this section must be performed with the engine oil drained.
- When removing and installing the oil pump, use care not to allow dust or dirt to enter the engine.
- If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump as an assembly.
- After the oil pump has been installed, check that there are no oil leaks.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	At draining	0.6 liter (0.6 US qt, 0.5 Imp qt)	–
	At disassembly	0.7 liter (0.7 US qt, 0.6 Imp qt)	–
Recommended engine oil		Honda "4-STROKE MOTORCYCLE OIL" or equivalent API service classification: SJ except oils labeled as energy conserving the circular API service label Viscosity: SAE 10W-30 (Use 10W-30 regardless of atmospheric temperature) JASO: MA or MB	–
Oil pump rotor	Tip clearance	0.15 (0.006)	0.20 (0.008)
	Body clearance	0.15 – 0.20 (0.006 – 0.008)	0.22 (0.009)
	Side clearance	0.05 – 0.10 (0.002 – 0.004)	0.12 (0.005)

TORQUE VALUES

Oil pump cover screw	2.0 N·m (0.2 kgf·m, 1.4 lbf·ft)

TROUBLESHOOTING

Engine oil level too low
- Oil consumption
- External oil leak
- Worn piston ring or incorrect piston ring installation
- Worn cylinder
- Worn valve guide or seal

Oil contamination
- Oil not changed often enough
- Faulty cylinder head gasket
- Worn piston ring

OIL PUMP

REMOVAL

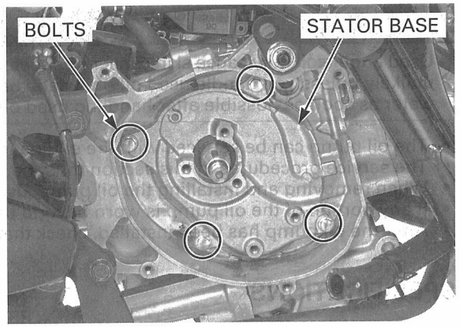
When removing and installing the oil pump, do not allow dust or dirt to enter the engine.

Drain the engine oil (page 4-10).
Drain the coolant from the cooling system (page 7-6).

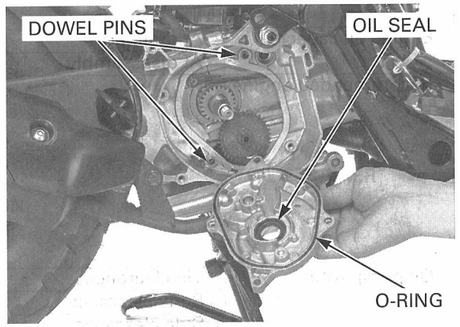
Remove the following:

- Radiator (page 7-13)
- Alternator/starter (page 12-4)

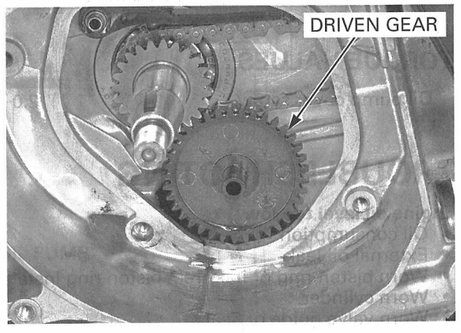
Remove the four bolts and stator base.



Remove the dowel pins, O-ring and oil seal.

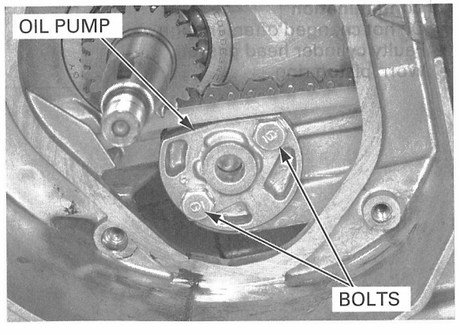


Remove the oil pump driven gear.



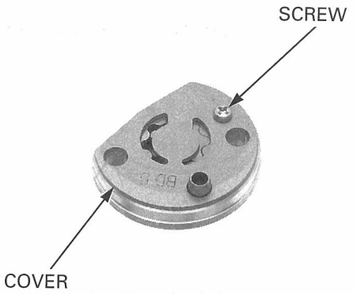
Be careful not to drop the bolts into the crankcase.

Remove the bolts and oil pump from the crankcase.

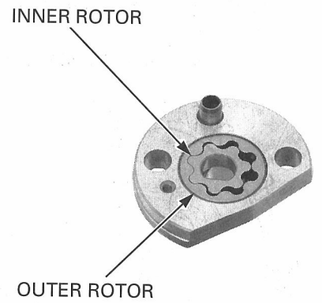


DISASSEMBLY

Remove the screw and oil pump cover.



Remove the oil pump outer rotor and inner rotor.



INSPECTION

NOTE:

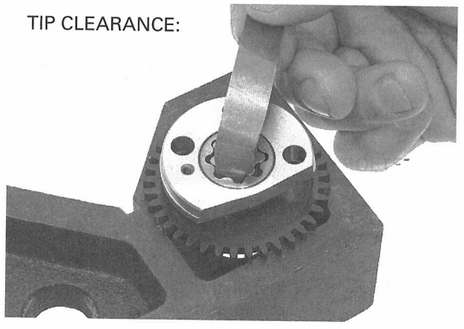
- Measure each clearance at several points and use the largest reading to compare the service limit.

Temporarily install the outer, inner rotors and driven gear into the oil pump body.

Measure the tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)

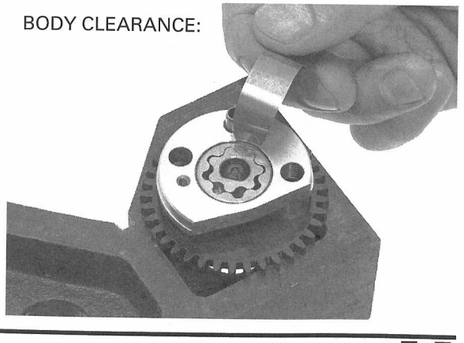
TIP CLEARANCE:



Measure the pump body clearance.

SERVICE LIMIT: 0.22 mm (0.009 in)

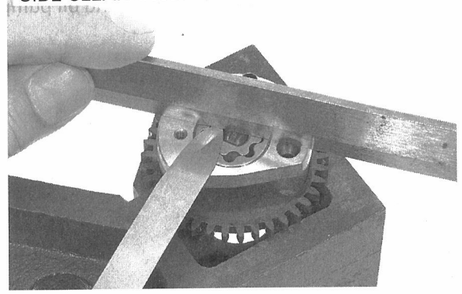
BODY CLEARANCE:



Measure the side clearance using a straight edge and feeler gauge.

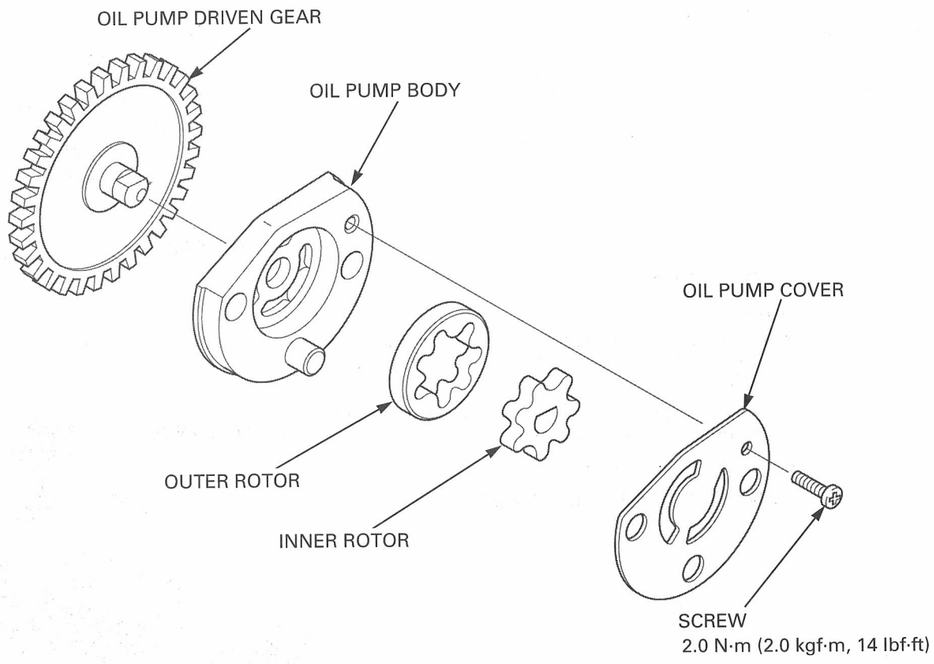
SERVICE LIMIT: 0.12 mm (0.005 in)

SIDE CLEARANCE:

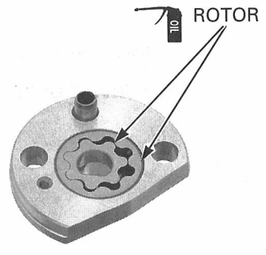


ASSEMBLY

Dip all parts in clean engine oil before assembly.



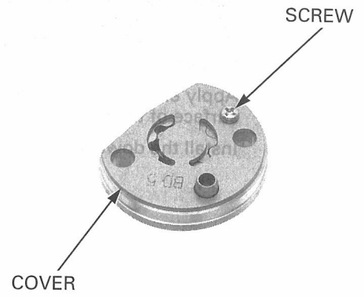
Install the outer rotor and inner rotor into the oil pump body.



Install the oil pump cover onto the oil pump body.

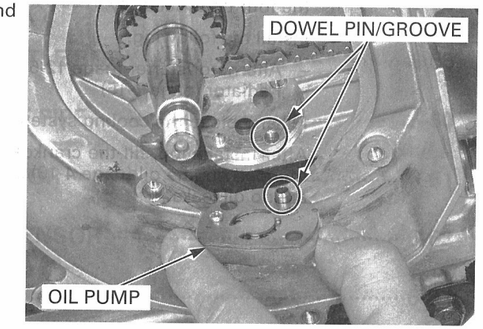
Install and tighten the oil pump cover screw to the specified torque.

TORQUE: 2.0 N·m (0.2 kgf·m, 1.4 lbf·ft)

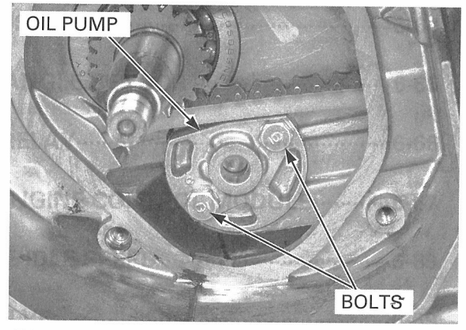


INSTALLATION

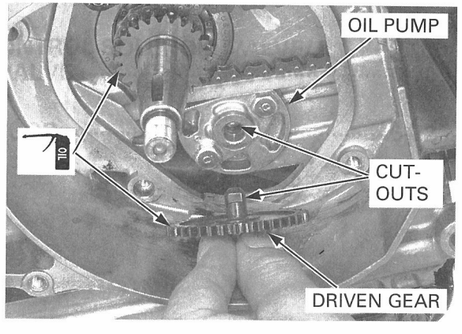
Install the oil pump by aligning the dowel pin and screw with the grooves of the crankcase.



Install and tighten the mounting bolts securely.



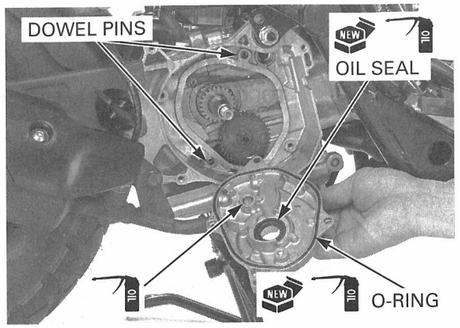
Apply engine oil to the drive gear and driven gear sliding surface/gear teeth.
Install the driven gear by aligning the cut-outs of the driven gear and oil pump inner rotor.



Apply engine oil to a new oil seal lip and install it into the stator base.
Coat a new O-ring with oil and install it into the stator base.

Apply engine oil to the oil pump driven gear sliding surface of the stator base.

Install the dowel pins into the crankcase.



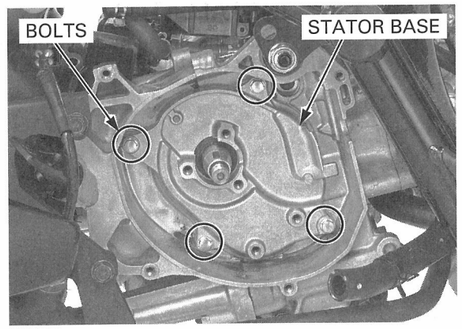
Install the stator base on the crankcase and tighten the four bolts securely.

Install the following:

- Alternator/starter (page 12-5)
- Radiator (page 7-15)

Fill and bleed the cooling system (page 7-7).

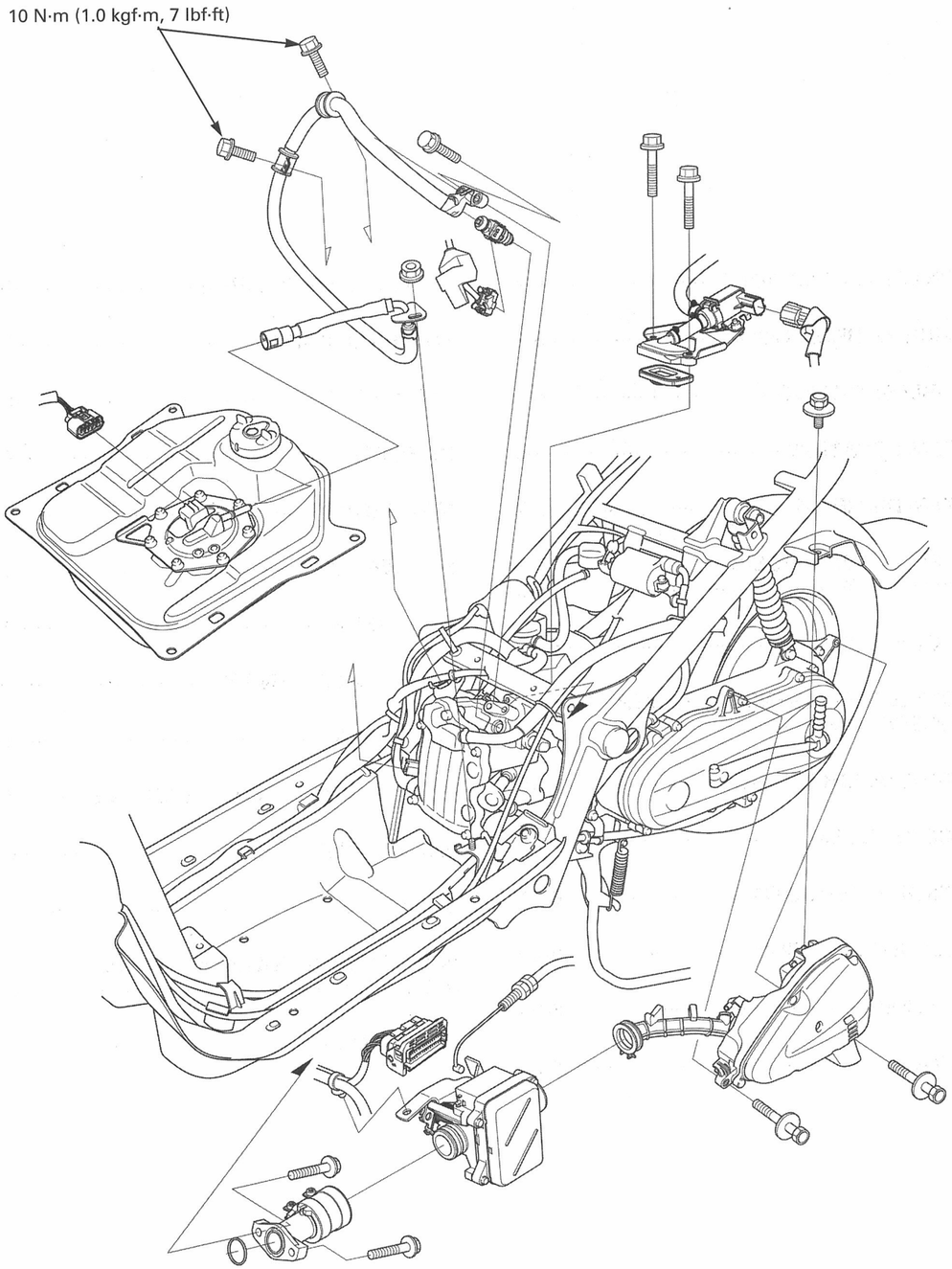
After installation, fill the crankcase with the recommended engine oil (page 4-10) and check that there are no oil leaks.



6. FUEL SYSTEM (Programmed Fuel Injection)

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MIL TROUBLESHOOTING 6-15
DTC CODE INDEX 6-28
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FUEL TANK 6-52
AIR CLEANER HOUSING 6-53
THROTTLE BODY 6-55
INTAKE PIPE 6-60
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ECT SENSOR 6-63
TP SENSOR 6-64
BANK ANGLE SENSOR 6-65
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IAC VALVE 6-69
PCV CONTROL SOLENOID VALVE/ REED VALVE 6-70
O_2 SENSOR 6-72

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- Before disconnecting fuel feed hose, relieve pressure from the system by disconnecting the quick connect fitting in the fuel pump (page 6-46).
- Bending or twisting the control cable will impair smooth operation and could cause the cable to stick or bend, resulting in loss of vehicle control.
- Work in a well ventilated area. Smoking or allowing flames or sparks in the work area or where gasoline is stored can cause a fire or explosion.
- Do not apply commercially available carburetor cleaners to the inside of the throttle bore, which is coated with molybdenum.
- Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.
- Seal the cylinder head intake port with tape or a clean cloth to keep dirt and debris from entering the intake port after the throttle body has been removed.
- Do not damage the throttle body. It may cause incorrect throttle valve.
- Prevent dirt and debris from entering the throttle bore and fuel feed hose, clean them using compressed air.
- The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.
- Do not push the fuel pump base under the fuel tank when the fuel tank is stored.
- Do not loosen or tighten the white painted bolts, nuts and screws of the throttle body with engine control module (ECM). Loosening or tightening them can cause ECM malfunction.
- Always replace the packing when the fuel pump is removed.
- It is impossible to disassemble the fuel pump after removing it.
- The programmed fuel injection (PGM-FI) system is equipped with the Self-Diagnostic System described (page 6-8). If the malfunction indicator lamp (MIL) blinks, follow the Self-Diagnostic Procedures to remedy the problem.
- When checking the PGM-FI, always follow the steps in the troubleshooting flow chart (MIL trouble shooting:page 6-15 or DTC trouble shooting:page 6-31).
- The PGM-FI system is provided with fail-safe function to secure a minimum running capability even when there is any trouble in the system. When any abnormality is detected by the self-diagnosis function, running capability is secured by making use of the numerical values of a situation preset in advance in the simulated program map. It must be remembered, however, that when any abnormality is detected in injector the fail safe function stops the engine from the standpoint of protecting it.
- Refer to PGM-FI system location (page 6-6).
- A faulty PGM-FI system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- The vehicle speed sensor sends digital pulse signal to the ECM (PGM-FI unit) and computation. Refer to procedures for vehicle speed sensor inspection (MIL troubleshooting:page 6-15 or DTC trouble shooting:page 6-31).
- When disassembling the programmed fuel injection parts, note the location of the O-rings. Replace them with new ones upon reassembly.
- Use a digital tester for PGM-FI system inspection.
- Refer to procedures for fuel level sensor inspection (page 19-10).

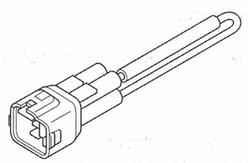
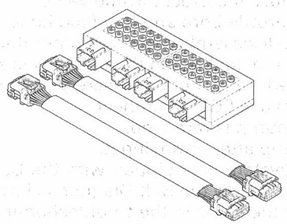
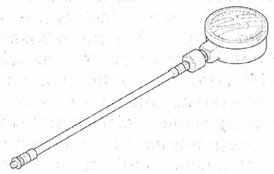
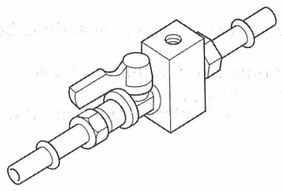
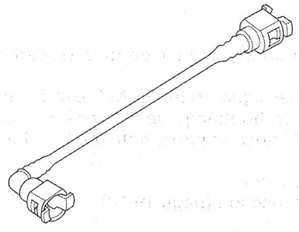
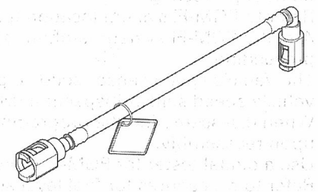
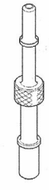
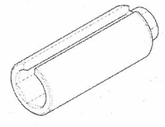
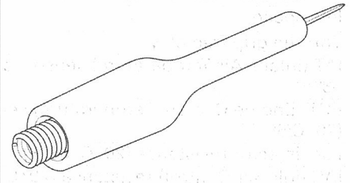
SPECIFICATIONS

ITEM	SPECIFICATIONS
Throttle body identification number	GQL0A
Idle speed	2,000 ± 100 min^{-1} (rpm)
Throttle grip free play	2 – 6 mm (1/16 – 1/4 in)
IAT (Intake Air Temperature) sensor resistance (20° C/ 68° F)	2.4 – 2.7 kΩ
ECT (Engine Coolant Temperature) sensor resistance (20° C/68° F)	2.4 – 2.7 kΩ
Fuel injector resistance (20° C /68° F)	11.1 – 12.3 Ω
IAC (Idle Air Control) resistance (20° C /68° F)	120 – 140 Ω
PCV control solenoid valve resistance (20° C /68° F)	30 – 34 Ω
Fuel pressure	294 kPa (3.0 kgf/cm^2, 43 psi)
Fuel pump flow (at 12 V)	42 cm^3 (1.4 US oz, 1.5 Imp oz) minimum/10 seconds

TORQUE VALUES

Fuel feed hose stay bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)	
ECT sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)	
PCV control solenoid valve bolt	5.9 N·m (0.6 kgf·m, 4.3 lbf·ft)	
Insulator band screw	2.9 N·m (0.3 kgf·m, 2.1 lbf·ft)	
Bank angle sensor mounting screw	1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)	
Breather hose joint screw	0.8 N·m (0.08 kgf·m, 0.6 lbf·ft)	
Fuel pump unit mounting nut	12 N·m (1.2 kgf·m, 9 lbf·ft)	Tightening order: See page 6-50
O_2 sensor	44 N·m (4.5 kgf·m, 33 lbf·ft)	

TOOLS

DLC short connector 070PZ-ZY30100 	ECM test harness 070MZ-GEV0100 	Fuel pressure gauge 07406-0040004 
Pressure gauge manifold 07ZAJ-S5A0111 	Fuel attachment hose A 07ZAJ-S5A0120 	Fuel attachment hose B 07ZAJ-S5A0130 
Fuel attachment joint B 07ZAJ-S5A0150 	O_2 sensor wrench 07LAA-PT50101 	Test probe 07ZAJ-RDJA110 

TROUBLESHOOTING

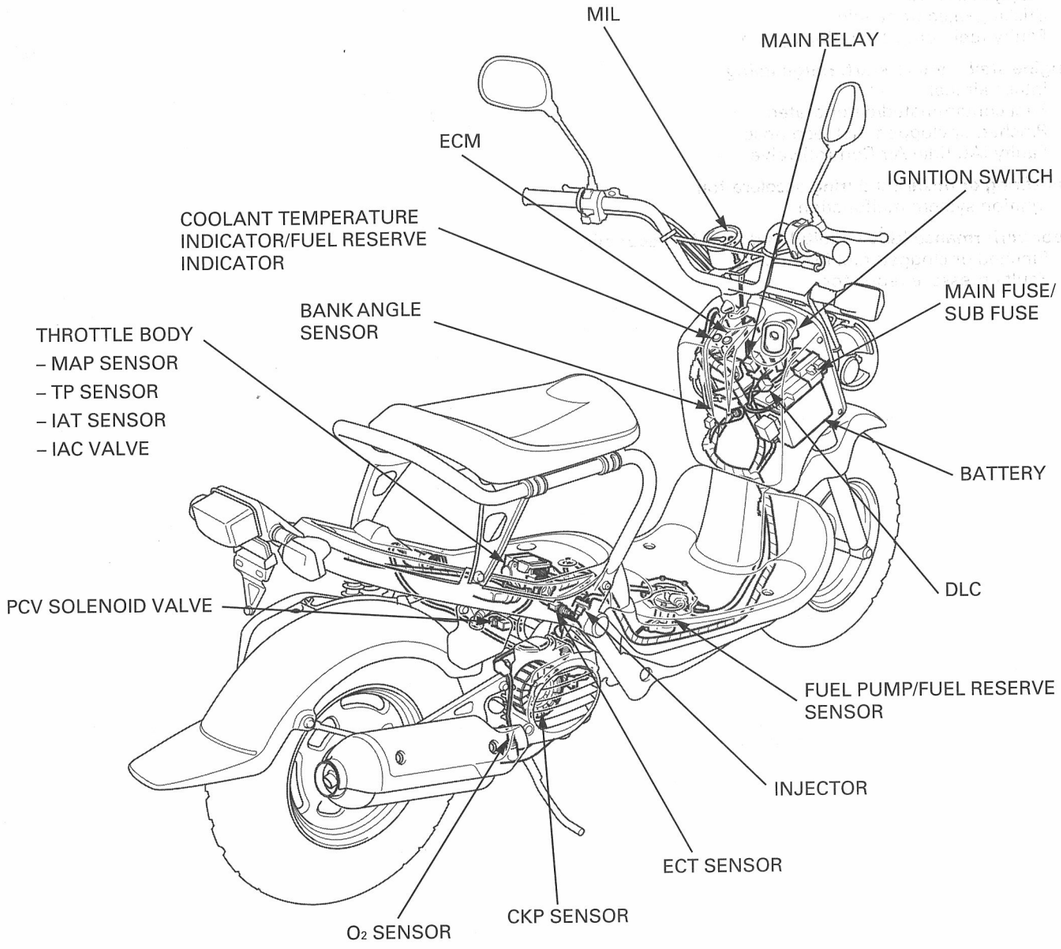
Engine won't to start
- Intake air leak
- Fuel contaminated/deteriorated
- Pinched or clogged fuel feed hose
- Faulty fuel pump
- Clogged fuel filter
- Faulty IAC (Idle Air Control) valve
- Clogged injector
- Sticking injector needle
- Faulty fuel pump operating system

Engine stall, hard to start, rough idling
- Intake air leak
- Fuel contaminated/deteriorated
- Pinched or clogged fuel feed hose
- Faulty IAC (Idle Air Control) valve

Backfiring or misfiring during acceleration
- Ignition system malfunction

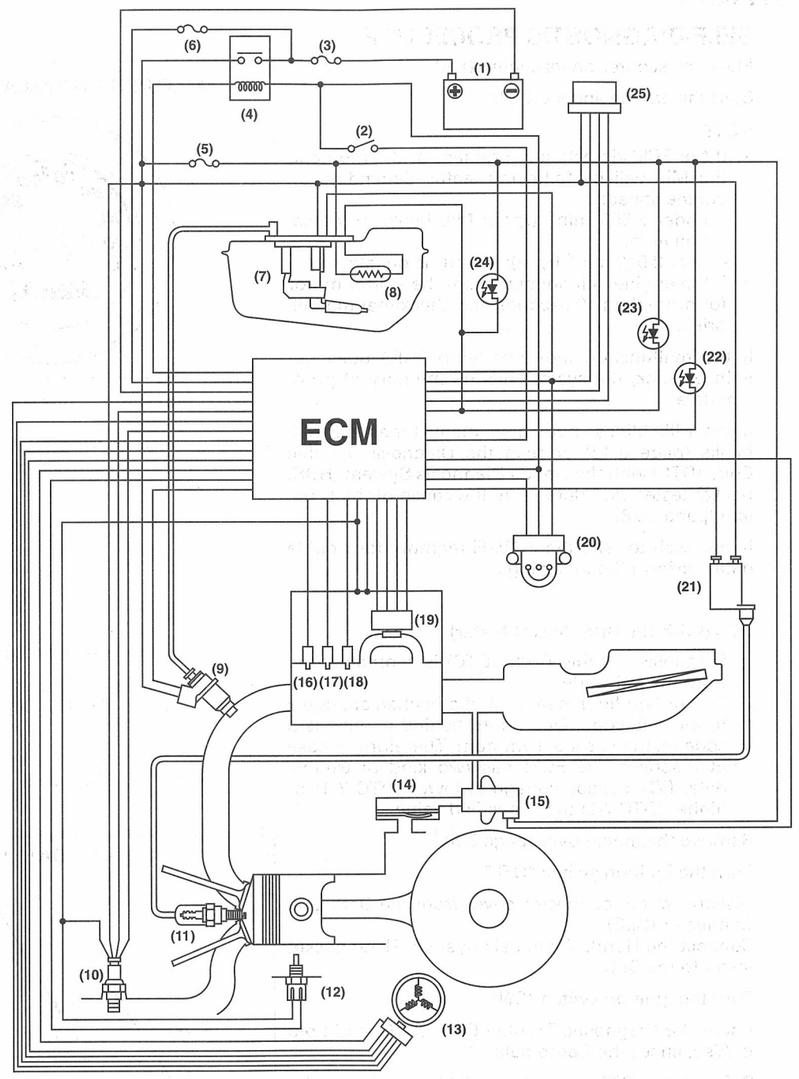
Poor performance (drive ability) and poor fuel economy
- Pinched or clogged fuel feed hose
- Faulty pressure regulator

SYSTEM LOCATION



FULL NAME	ABBREVIATIONS
Manifold absolute sensor	MAP sensor
Throttle position sensor	TP sensor
Intake air temperature sensor	IAT sensor
Engine coolant temperature sensor	ECT sensor
Idle air control valve	IAC valve
Crankshaft position sensor	CKP sensor
Malfunction indicator lamp	MIL
Data link connector	DLC
Engine control module	ECM

SYSTEM DIAGRAM



(1)	Battery	(14)	PAIR reed valve
(2)	Ignition switch	(15)	PAIR control solenoid valve
(3)	Main fuse (20 A)	(16)	IAC valve
(4)	Main relay	(17)	IAT sensor
(5)	Sub fuse (15 A)	(18)	MAP sensor
(6)	Sub fuse (15 A)	(19)	TP sensor
(7)	Fuel pump	(20)	Bank angle sensor
(8)	Fuel reserve sensor	(21)	Ignition coil
(9)	Injector	(22)	Malfunction indicator lamp (MIL)
(10)	O_2 sensor	(23)	Coolant temperature indicator
(11)	Spark plug	(24)	Fuel reserve indicator
(12)	ECT sensor	(25)	Data link connector (DLC)
(13)	CKP sensor		

PGM-FI SELF-DIAGNOSIS INFORMATION

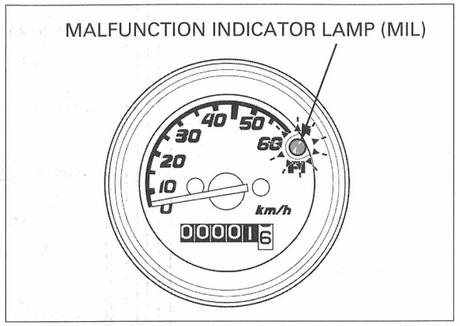
SELF-DIAGNOSTIC PROCEDURE

Place the scooter on its centerstand.

Start the engine and let it idle.

NOTE:

- If the ECM detects any problem at the moment, the MIL will be following status depending on engine speed:
  - under 2,500 min^{-1} (rpm): MIL blinks as detection item.
  - over 2,500 min^{-1} (rpm): MIL turns on (stay lit).
- If the engine will not start, turn the starter motor for more than 10 seconds and check that the MIL brink.



If the malfunction indicator lamp (MIL) does not light or blink, the system has no memory of problem data.

If the MIL blinks, note how many times the MIL blinks (page 6-12) or read the Diagnosis Trouble Code (DTC) with the Honda Diagnosis System (HDS) pocket tester, and determine the cause of the problem (page 6-28).

If you wish to read the PGM-FI memory for trouble data, perform the following:

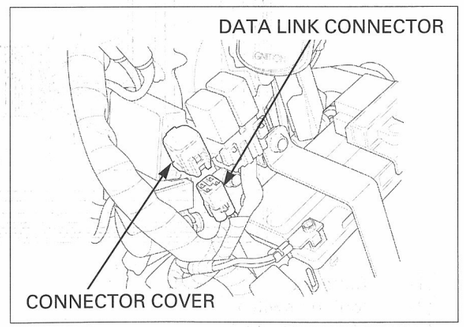
DTC (With the HDS Pocket tester)

- Diagnosis Trouble Code (DTC) is segmentalized from the MIL code.
  One or two figures in front of a hyphen are equal to the MIL code. One figure behind hyphen is a code on the basis of symptom. Therefore, in case ECT sensor, the ECM has two kind of trouble data, ECT sensor voltage is lower (DTC 7-1) or higher (DTC 7-2) than specified value.

Remove the inner cover (page 3-5).

Turn the ignition switch "OFF".

Disconnect the connector cover from the Data Link Connector (DLC).
Connect the Honda Diagnosis System (HDS) pocket tester to the DLC.



Turn the ignition switch "ON".

Check the Diagnostic Trouble Code (DTC) and note it. Also, check the freeze data.

Refer to the DTC index (page 6-28) and begin the appropriate troubleshooting procedure.

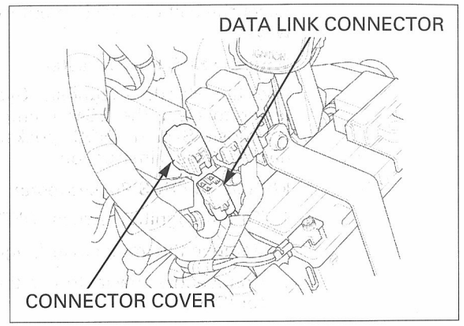
- For specific operations, refer to the user's manual that came with the Honda Diagnosis System (HDS) pocket tester.

MIL code (Without the HDS Pocket tester)

Remove the inner cover (page 3-5).

Turn the ignition switch "OFF".

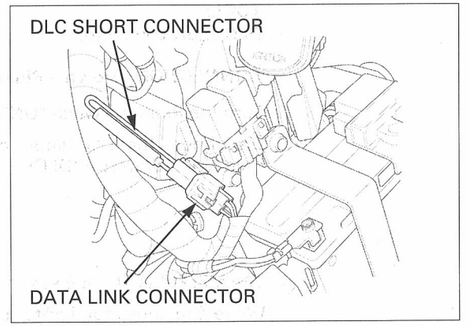
Disconnect the connector cover from Data Link Connector (DLC) terminals.



Connect the special tool to the Data Link Connector (DLC).

TOOL:
DLC short connector 070PZ-ZY30100

CONNECTION: Brown – Blue/Green



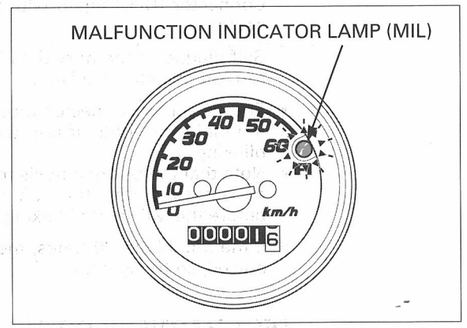
Turn the ignition switch "ON".

Even if the ECM has memory data, the MIL does not blink when the engine running.

If the ECM has no self diagnosis memory data, the MIL will illuminate, when you turn the ignition switch "ON".

If the ECM has self diagnosis memory data, the MIL will start blinking when you turn the ignition switch "ON".

Note how many times the MIL blinks, and determine the cause of the problem (page 6-12).



SELF-DIAGNOSIS RESET PROCEDURE

Reset the self-diagnosis memory data in either of 2 ways;

With the HDS Pocket tester

Use the Honda Diagnosis System (HDS) pocket tester to clear the ECM memory. See the Honda Diagnosis System (HDS) pocket tester user's manual for specific instruction.

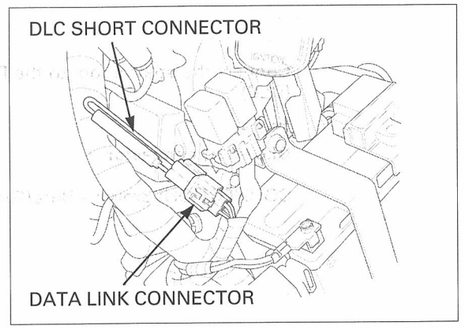
Without the HDS Pocket tester

1. Turn the ignition switch "OFF".
2. Remove the inner cover (page 3-5).
3. Connect the special tool to the Data Link Connector (DLC).

   TOOL:
   DLC short connector **070PZ-ZY30100**

   CONNECTION: Brown – Blue/Green

4. Turn the ignition switch "ON".
5. Disconnect the DLC short connector from the Data Link Connector (DLC).

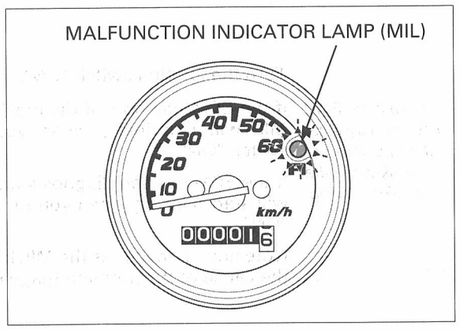


6. The MIL lights about 5 seconds.

   While the indicator lights, short the Data Link Connector (DLC) again with the DLC short connector.

   Self-diagnosis memory data is erased, if the MIL turn off and start blinking.

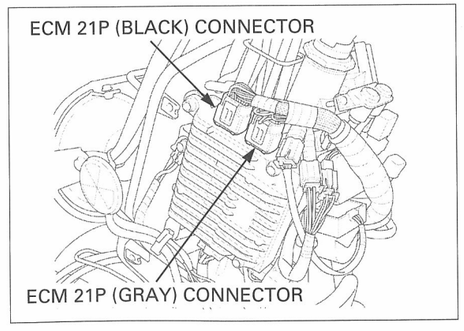
- The data link connector must be jumped while the indicator lights. If not, the MIL will not start blinking.
- Note that the self diagnosis memory data cannot be erased if you turn off the ignition switch before the MIL starts blinking.
- If the MIL blinks 20 times, the data has not been erased, so try again.



TEST HARNESS CONNECTION

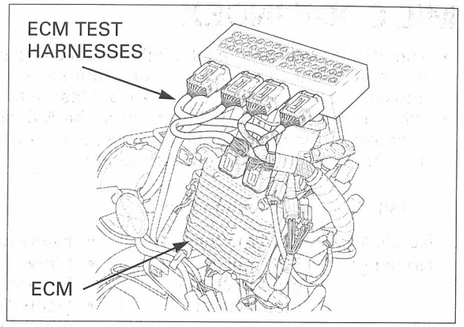
Remove the inner cover (page 3-5).

Disconnect the ECM 21P (Black) and 21P (Gray) connectors from the ECM.



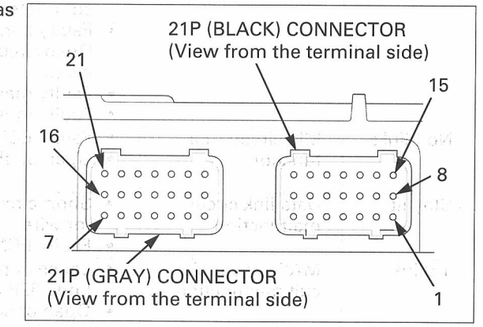
Connect the ECM test harnesses between the main wire harness and the ECM.

TOOL:
ECM test harness **070MZ-GEV0100**

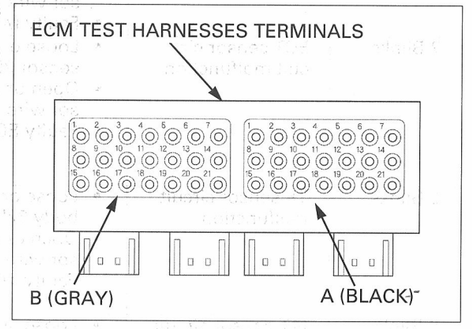


TEST HARNESS TERMINAL LAYOUT

The ECM connector terminals are numbered as shown in this illustration.



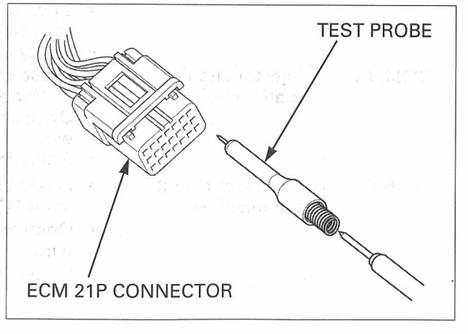
The ECM test harness terminals are numbered as shown in this installation.
Because signal of the ECM is outputted from the same position of the ECM test harness terminal.



TEST PROBE CONNECTION

Connect the test probe between the ECM 21P connector and the digital multimeter when inspecting continuity or voltage at the ECM 21P connectors.

TOOL:
Test probe **07ZAJ-RDJA110**



MIL CODE INDEX

- The PGM-FI MIL denotes the failure codes (the number of blinks from 0 to 52). When the indicator lights for 1.3 seconds it is equivalent to ten blinks. For example, a 1.3 second illumination and two blinks (0.5 second x 2) of the indicator equals 12 blinks. Follow code 12 troubleshooting (page 6-21).
- When more than one failure occurs, the MIL shows the blinks in the order of lowest number to highest number. For example; if the indicator blinks once, then seven times are repeat, two failures have occurred. Follow codes 1 (page 6-15) after 7 (page 6-17) troubleshooting.

MIL	Detection Item	Causes	Symptoms	Refer to
No blinks	ECM malfunction	• Faulty ECM	• Engine does not start	–
No blinks	ECM power/ ground circuit malfunction	• Blown sub-fuse (15 A) (Starter/ ignition/fuel pump) • Open circuit at the power input wire of the ECM • Open circuit in bank angle sensor related circuit • Faulty bank angle sensor • Open circuit in main relay related wires • Faulty main relay • Faulty ignition switch	• Engine does not start	6-67
No blinks	MIL circuit malfunction	• Faulty ECM • Open or short circuit in MIL wire	• Engine operates normally • MIL does not blink	–
Stay lit	Data link circuit malfunction	• Short circuit in data link connector wire • Faulty ECM	• Engine operates normally	–
1 Blink	MAP sensor circuit malfunction	• Loose or poor contact on throttle body 32P connector • Open or short circuit in MAP sensor wire • Faulty MAP sensor	• Poor performance at idle speed	6-15
7 Blinks	ECT sensor circuit malfunction	• Loose or poor contact on ECT sensor 2P (Black) connector • Open or short circuit in ECT sensor wire • Faulty ECT sensor	• Hard start at a low temperature (Simulate using numerical values; 90 °C/ 194 °F) • Low engine speed • Coolant temperature indicator turns on	6-17
8 Blinks	TP sensor circuit malfunction	• Loose or poor contact on throttle body 32P connector • Open or short circuit in TP sensor wire • Faulty TP sensor	• Poor engine response and performance when operating the throttle quickly (Simulate using numerical values; Throttle opens 0°)	6-18
9 Blinks	IAT sensor circuit malfunction	• Loose or poor contact on throttle body 32P connector • Open or short circuit in IAT sensor wire • Faulty IAT sensor	• Engine operates normally (Simulate using numerical values; 25 °C/ 77 °F)	6-19
12 Blinks	Injector circuit malfunction	• Loose or poor contact on injector 2P (Black) connector • Open or short circuit in injector wire • Faulty injector	• Engine does not start	6-21
21 Blinks	O_2 sensor circuit malfunction	• Loose or poor contact on O_2 sensor 4P (Natural) connector • Open or short circuit in O_2 sensor wire • Faulty O_2 sensor	• Engine operates normally	6-22

MIL	Detection Item	Causes	Symptoms	Refer to
23 Blinks	O_2 sensor heater malfunction	• Loose or poor contact on O_2 sensor 4P (Natural) connector • Open or short circuit in O_2 sensor heater wire • Faulty O_2 sensor	• Engine operates normally	6-24
29 Blinks	Idle air control (IAC) valve malfunction	• Loose or poor contact on throttle body 32P connector • Open or short circuit in IAC valve wire • Faulty IAC valve	• Poor performance at idle speed	6-25
52 Blinks	Crankshaft position (CKP) sensor/ alternator malfunction	• Loose or poor contact on alternator/starter 6P (Natural) connector • Open or short circuit in CKP sensor/alternator wire • Faulty CKP sensor/alternator	• Engine does not start • Starter motor does not operate	6-26

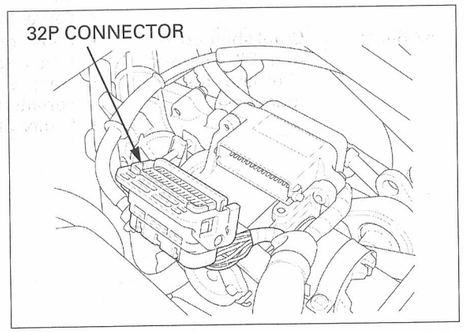
THROTTLE BODY (SENSOR) POWER LINE INSPECTION

- When the MIL blinks 1, 8 and 9 times, check the followings before MIL troubleshooting.
- Before starting the inspection, check for loose or poor contact on the ECM 21P (Black), 21P (Gray), 5P (Black) and throttle body 32P connectors, then recheck the MIL blinking.

1. Throttle Body Input Voltage Inspection

Remove the floor step (page 3-7).

Turn the ignition switch "OFF".
DIsconnect the throttle body 32P connector.



Turn the ignition switch "ON".

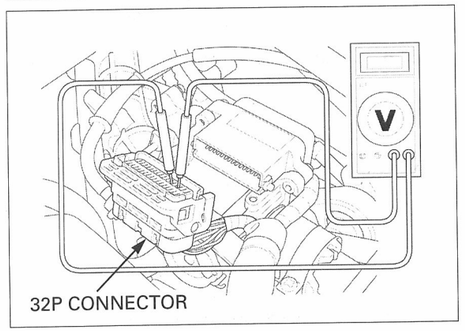
Measure the voltage at the wire harness side 32P connector terminals.

CONNECTION: Yellow/Red (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 – 5.25 V?

YES – Refer to MIL troubleshooting (page 6-15).

NO – GO TO STEP 2.



2. Throttle Body Output Voltage Line Short Circuit Inspection

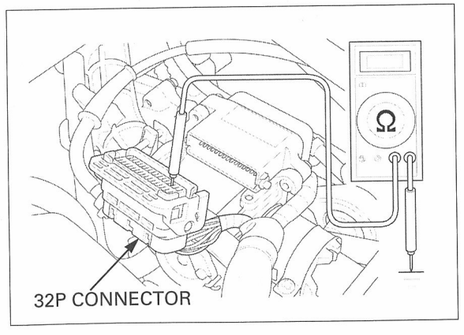
Turn the ignition switch "OFF".
Check for continuity between the throttle body 32P connector wire harness side and ground.

CONNECTION: Yellow/Red – Ground

Is there continuity?

YES – Short circuit in Yellow/Red wire.

NO – GO TO STEP 3.



3. Throttle Body Output Voltage Inspection

Connect the test harness to ECM connectors (page 6-10).

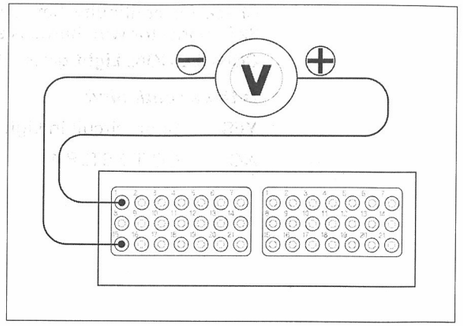
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: B1 (+) – B15 (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 – 5.25 V?

YES – GO TO STEP 4.

NO – Recheck the ECM with a new one, and recheck.



4. Throttle Body Power Line Continuity Inspection

Turn the ignition switch "OFF".

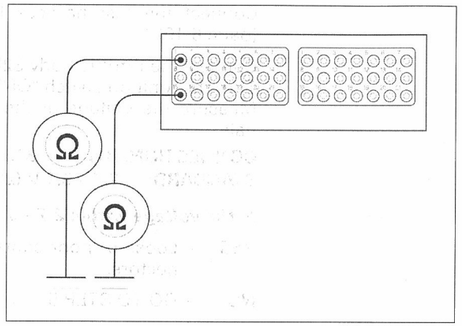
Check for continuity between the test harness terminals and ground.

CONNECTION: B1 – Ground
B15 – Ground

Is there continuities?

YES – Loose or poor contact on the ECM connectors.

NO – • Open circuit in Yellow/Red wire.
• Open circuit in Green/Pink wire.



MIL TROUBLESHOOTING

MIL 1 BLINKS (MAP SENSOR)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the MIL blinking.

1. Throttle Body Power Line Inspection

Check the throttle body power line inspection (page 6-14).

Is the throttle body power line normally?

YES – GO TO STEP 2.

NO – Replace or repair the abnormal circuit.

2. MAP Sensor Output Voltage Inspection

DIsconnect the throttle body 32P connector.

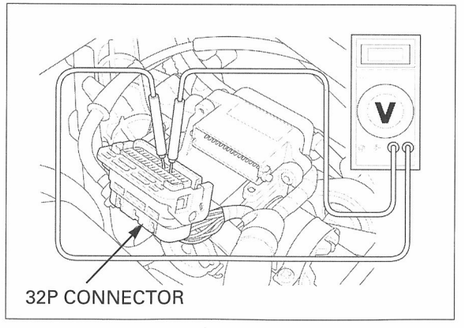
Turn the ignition switch "ON".
Measure the voltage at the wire harness side.

CONNECTION: Light green/Yellow (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 – 5.25 V?

YES – Faulty throttle body (MAP sensor).

NO – GO TO STEP 3.



3. **MAP Sensor Short Circuit Inspection**

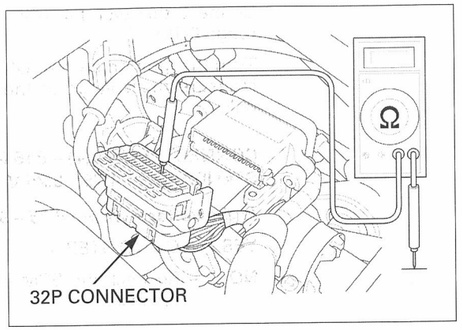
Check for continuity between the throttle body 32P connector wire harness side and ground.

CONNECTION: Light green/Yellow – Ground

Is there continuity?

YES – Short circuit in Light green/Yellow wire.

NO – GO TO STEP 4.



4. **MAP Sensor Output Voltage Inspection**

Connect the test harness to ECM connectors (page 6-10).

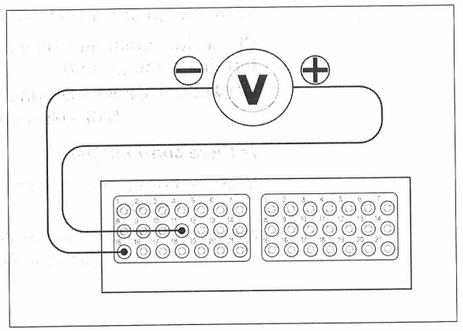
Connect the throttle body 32P connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: B11 (+) – B15 (–)
STANDARD: 2.7 – 3.1 V (20° C/68° F)

Is the voltage within 2.7 – 3.1 V?

YES – Loose or poor contact on the ECM connectors.

NO – GO TO STEP 5.



5. **MAP Sensor CIrcuit Continuity Inspection**

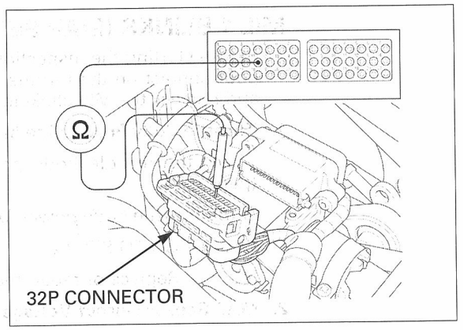
Turn the ignition switch "OFF".
Disconnect the throttle body 32P connector.
Check for continuity between the test harness terminal and throttle body 32P connector wire harness side terminal.

CONNECTION: B11 – Light Green/Yellow

Is there continuity?

YES – Replace the ECM with a new one, and recheck.

NO – Open circuit or poor contact in Light green/Yellow wire.



MIL 7 BLINKS (ECT SENSOR)

- Before starting the inspection, check for loose or poor contact on the ECT sensor 2P (Black) connector and recheck the MIL blinking.

1. **ECT Sensor Output Voltage Inspection**

Turn the ignition switch "OFF".
Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

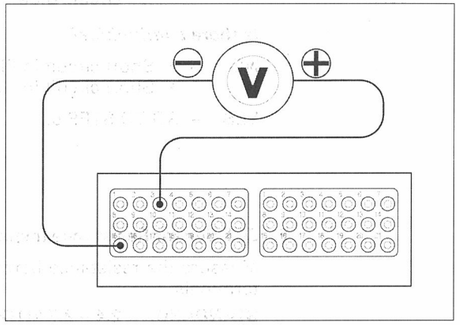
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: B3 (+) – B15 (–)
STANDARD: 2.9 – 3.4 V (20° C/68° F)

Is the voltage within 2.9 – 3.4 V?

YES – Loose or poor contact on the ECM connectors.

NO – GO TO STEP 2.



2. **ECT Sensor Input Voltage Inspection**

Turn the ignition switch "OFF".
Disconnect the ECT sensor 2P (Black) connector (page 6-63).

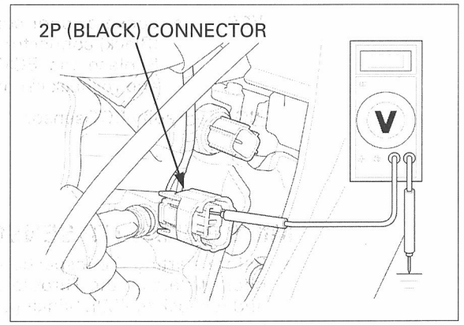
Turn the ignition switch "ON" then measure the voltage at the ECT sensor connector of the wire harness side and ground.

CONNECTION: Pink (+) – Ground (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 – 5.25 V?

NO – GO TO STEP 5.

YES – GO TO STEP 3.



3. **ECT Sensor Open circuit Inspection**

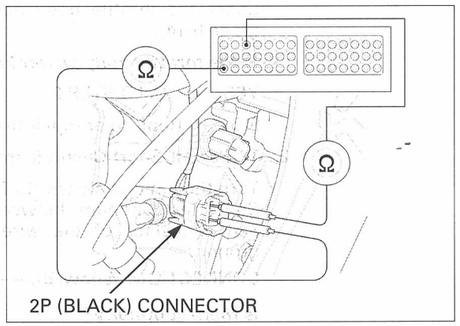
Turn the ignition switch "OFF".
Check for continuity between the test harness terminals and ECT sensor 2P (Black) connector of the wire harness side.

CONNECTION: B3 – Pink
B15 – Green/Blue

Is there continuities?

NO – GO TO STEP 4.

YES – • Open circuit in Pink wire.
• Open circuit in Green/Blue wire.



4. **ECT Sensor Short Circuit Inspection**

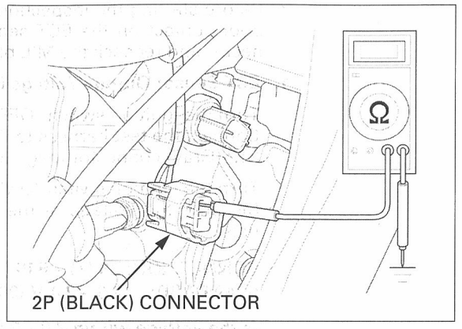
Check for continuity between the ECT sensor 2P (Black) connector of the wire harness side and ground.

CONNECTION: Pink – Ground
Green/Blue – Ground

Is there continuities?

NO – • Short circuit in Pink wire.
• Short circuit in Green/Blue wire.

YES – GO TO STEP 5..



5. **ECT Sensor Resistance Inspection**

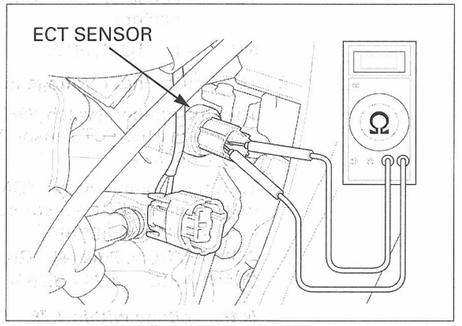
Measure the resistance between the ECT sensor terminals.

STANDARD: 2.4 – 2.7 kΩ (20°C/68°F)

Is the resistance within 2.4 – 2.7 kΩ (20°C/68°F)?

YES – • Loose or poor contact of the ECT 2P (Black) connector (from step 2).
• Replace the ECM with a new one, and recheck (from step 4).

NO – Faulty ECT sensor.



MIL 8 BLINKS (TP SENSOR)

- Before starting the inspection, check for loose or poor contact on the Throttle body 32P connector and recheck the MIL blinking.

1. **Throttle Body Power Line Inspection**

Check the throttle body power line inspection (page 6-14).

Is the throttle body power line normally?

YES – GO TO STEP 2.

NO – Replace or repair the abnormal circuit.

2. **TP Sensor Short Circuit Inspection**

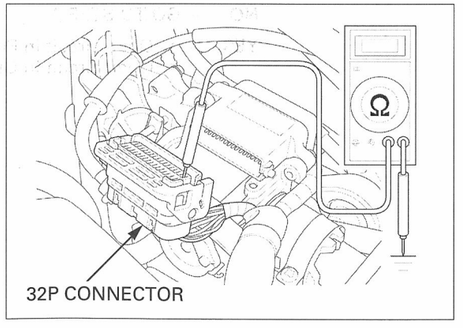
Turn the ignition switch "OFF".
Check for continuity between the throttle body 32P connector of the wire harness side and ground.

CONNECTION: Yellow/Blue – Ground

Is there continuity?

YES – Short circuit in Yellow/Blue wire.

NO – GO TO STEP 3.

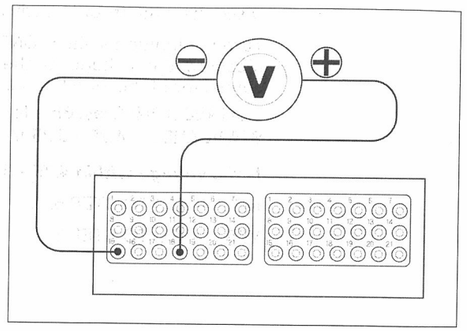


3. **TP Sensor Output Voltage Inspection**

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

Connect the throttle body 32P connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: B18 (+) – B15 (–)
STANDARD: *0.3 – 0.7 V (throttle fully closed)
***4.1 – 4.8 V (throttle fully opened)**



NOTE:

- A voltage marked * refers to the value of the ECM output voltage (STEP 3) when the voltage reading shows 5 V.
When the ECM output voltage reading shows other than 5 V, derive the TP sensor output voltage at the test harness as follows:
In the case of the ECM output voltage is 4.75 V:
0.3 x 4.75/5.0 = 0.28 V
0.7 x 4.75/5.0 = 0.67 V
Thus, the solution is "0.28 - 0.67 V" with the throttle fully closed.
Replace 0.3 and 0.7 with 4.1 and 4.8 respectively, in the above equations to determine the throttle fully opened range.

Is the voltage at the standard value?

YES – Loose or poor contact of the ECM 21P (Black) and 21P (Gray) connectors.

NO – GO TO STEP 4.

4. **TP Sensor Output Line Inspection**

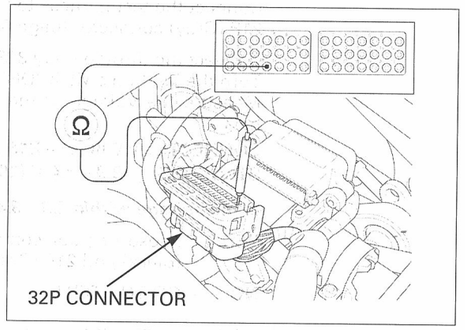
Turn the ignition switch "OFF".
Disconnect the throttle body 32P connector.
Check for continuity between the test harness and the throttle body 32P connector of the wire harness side.

CONNECTION: B18 – Yellow/Blue

Is there continuity?

YES – Faulty throttle body (TP sensor)

NO – Open or short circuit in Yellow/Blue wire.



MIL 9 BLINKS (IAT SENSOR)

- Before starting the inspection, check for loose or poor contact on the Throttle body 32P connector and recheck the MIL blinking.

1. **Throttle Body Power Line Inspection**

Check the throttle body power line inspection (page 6-14).

Is the throttle body power line normally?

YES – GO TO STEP 2.

NO – Replace or repair the abnormal circuit.

2. IAT Sensor Output Voltage Inspection

Disconnect the throttle body 32P connector.

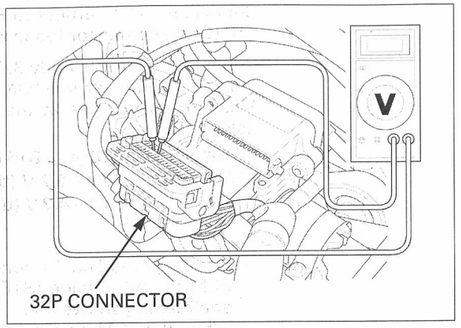
Turn the ignition switch "ON".
Measure the voltage at the throttle body 32P connector of the wire harness side.

CONNECTION: Gray/Blue (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 – 5.25 V?

NO – GO TO STEP 6.

YES – GO TO STEP 3.



3. IAT Sensor Short Circuit Inspection

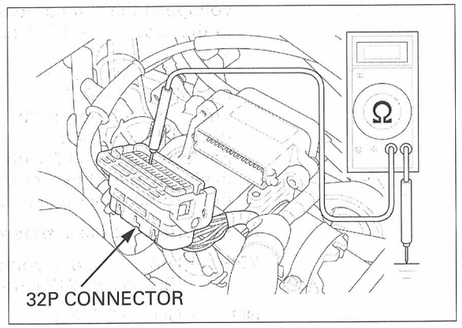
Check for continuity between the throttle body 32P connector of wire harness side and ground.

CONNECTION: Gray/Blue – Ground

Is there continuity?

YES – Short circuit in Gray/Blue wire.

NO – GO TO STEP 4.



4. IAT Sensor Output Voltage Inspection

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

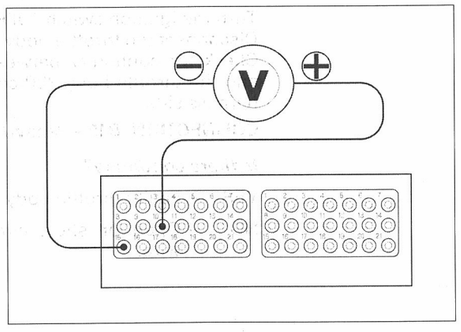
Connect the throttle body 32P connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: B10 (+) – B15 (–)
STANDARD: 2.9 – 3.4 V (20° C/68° F)

Is the voltage within 2.9 – 3.4 V?

YES – Loose or poor contact of the ECM 21P (Black) and 21P (Gray) connectors.

NO – GO TO STEP 5.



5. IAT Sensor Circuit Inspection

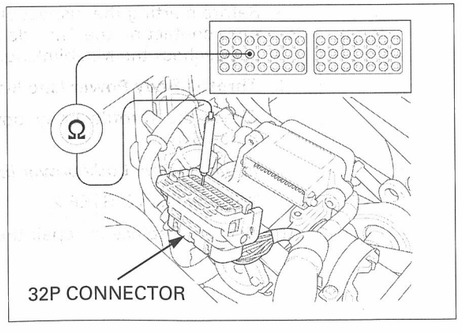
Turn the ignition switch "OFF".
Disconnect the throttle body 32P connector.
Check for continuity between the test harness and throttle body 32P connector of the wire harness side.

CONNECTION: B10 – Gray/Blue

Is there continuity?

YES – GO TO STEP 6.

NO – Open or poor contact in Gray/Blue wire.



6. IAT Sensor Resistance Inspection

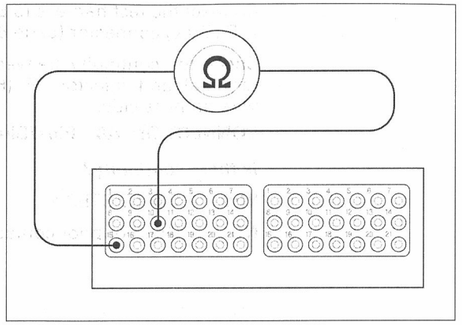
Disconnect the test harness connectors from the ECM.
Connect the throttle body 32P connector.
Measure the resistance at the test harness terminals.

CONNECTION: B10 – B15
STANDARD: 2.4 – 2.7 kΩ (20° C/68° F)

Is the resistance within 2.4 – 2.7 kΩ (20° C/68° F)?

YES – • Loose or poor contact of the throttle body 32P connector (from step 2).
• Replace the ECM with a new one, and recheck (from step 4).

NO – Faulty throttle body (IAT sensor)



MIL 12 BLINKS (INJECTOR)

- Before starting the inspection, check for loose or poor contact on the injector 2P (Black) connector and recheck the MIL blinking.

1. Injector Input Voltage Inspection

Remove the plug maintenance lid (page 4-6).

Turn the ignition switch "OFF".
Disconnect the injector 2P (Black) connector.

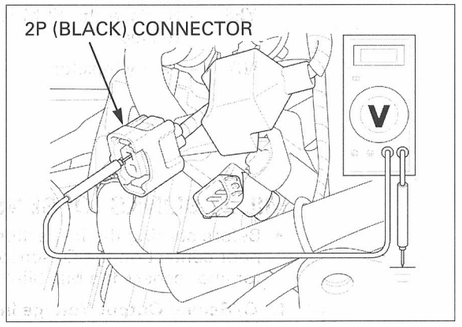
Turn the ignition switch "ON" then measure the voltage between the injector connector of the wire harness side and ground.

CONNECTION: Red/Black (+) – Ground (–)

Does the battery voltage exit?

NO – • Open circuit in Red/Black wire.
• Faulty main relay
• Replace the ECM with a new one, and recheck.

YES – GO TO STEP 2.



2. Injector Signal Line Short Circuit Inspection

Turn the ignition switch "OFF".

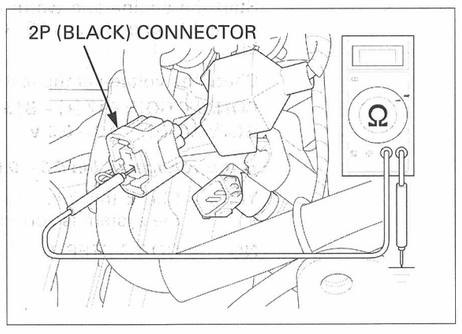
Check for continuity between the injector 2P (Black) connector of the wire harness side and ground.

CONNECTION: Pink/Blue – Ground

Is there continuity?

NO – Short circuit in Pink/Blue wire.

YES – GO TO STEP 3.



3. Injector Signal Line Open Circuit Inspection

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

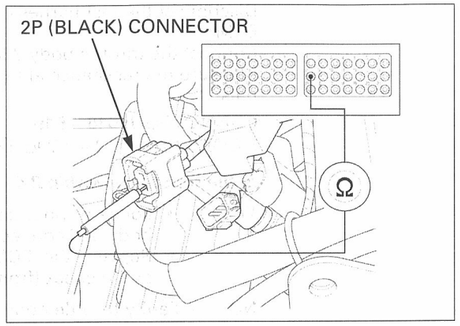
Check for continuity between the test harness terminal and injector 2P (Black) connector of wire harness side.

CONNECTION: A8 – Pink/Blue

Is there continuity?

YES – GO TO STEP 4.

NO – Open or poor contact in Pink/Blue wire.



4. Injector Resistance Inspection

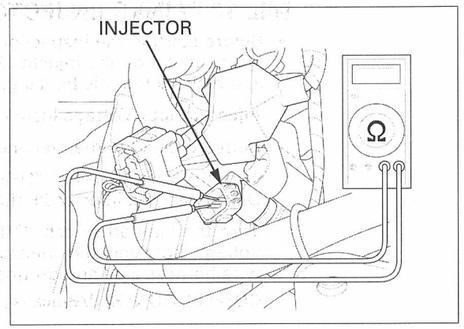
Measure the resistance of the injector 2P (Black) connector terminals.

STANDARD: 11.1 – 12.3 kΩ (20° C/68° F)

Is the resistance within 11.1 – 12.3 kΩ (20°C/68°F)?

YES – Replace the ECM with a new one, and recheck.

NO – Faulty injector.



MIL 21 BLINKS (O_2 SENSOR)

- Before starting the inspection, check for loose or poor contact on the O_2 sensor 4P (Black) connector and recheck the MIL blinking.

1. O_2 Sensor Output Voltage Inspection

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).
Start the engine and warm up the engine up to coolant temperature is 80 °C (176 °F), then let it idle.

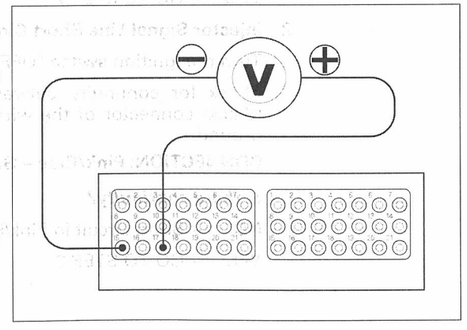
Check the voltage at the test harness terminals.

CONNECTION: B17 (+) – B15 (–)
STANDARD: 0.3 – 0.6 V

Is the voltage within 0.3 – 0.6 V?

YES – Check the fuel pressure (page 6-49), if the system is correct.

NO – GO TO STEP 2.



2. O_2 Sensor Open Circuit Inspection

Turn the ignition switch "OFF".

Disconnect the O_2 sensor 4P (Black) connector.

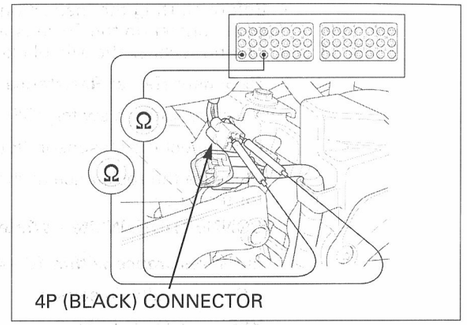
Check for continuity between the test harness terminals and the O_2 Sensor connector terminals of the wire harness side.

CONNECTION: B17 – Black/Orange
B15 – Gray/Blue

Is there continuities?

NO – • Open circuit in the Black/Orange (Black) wire.
• Open circuit in the Gray/Blue (Gray) wire.

YES – GO TO STEP 3.



3. O_2 Sensor Short Circuit Inspection

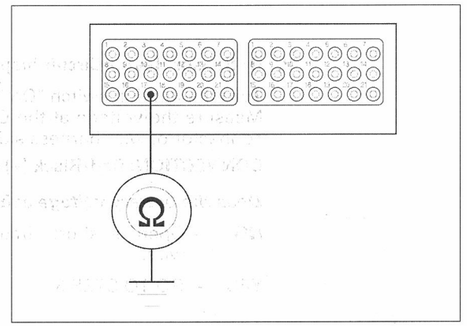
Connect the O_2 sensor 4P (Black) connector.
Check for continuity between the test harness terminal and ground.

CONNECTION: B17 – Ground

Is there continuity?

YES – Short circuit in the Black/Orange (Black) wire.

NO – GO TO STEP 4.



4. O_2 Sensor Inspection

Replace the O_2 sensor with a known good one (page 6-72).
Reset the ECM (page 6-10).

Turn the ignition switch "ON".
Warm the engine until the coolant temperature is 80 °C (176 °F), the let it idle.

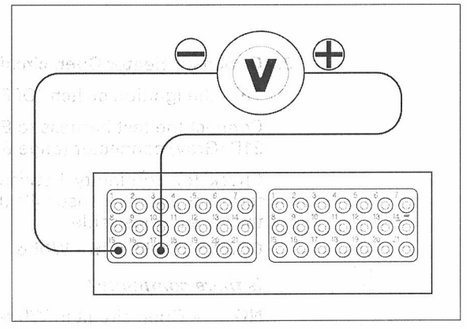
Check the voltage at the test harness terminal.

CONNECTION: B17 (+) – B15 (–)
STANDARD: 0.3 – 0.6 V

Is the voltage within 0.3 – 0.6 V?

YES – Faulty original O_2 sensor.

NO – Check the fuel supply system.



MIL 23 BLINKS (O_2 SENSOR HEATER)

- Before starting the inspection, check for loose or poor contact on the O_2 sensor 4P (Black) connector and recheck the MIL blinking.

1. O_2 Sensor Heater Resistance Inspection

Turn the ignition switch "OFF".

Disconnect the O_2 sensor 4P (Black) connector.

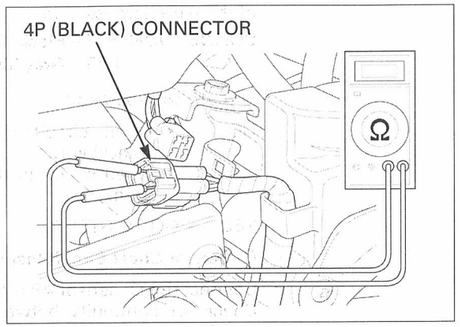
Measure the resistance at the O_2 sensor connector terminals.

CONNECTION: White – White

Is the resistance within 10 – 40 Ω(20°C/68°F)?

NO – Faulty O_2 sensor.

YES – GO TO STEP 2.



2. O_2 Sensor Heater Circuit Inspection

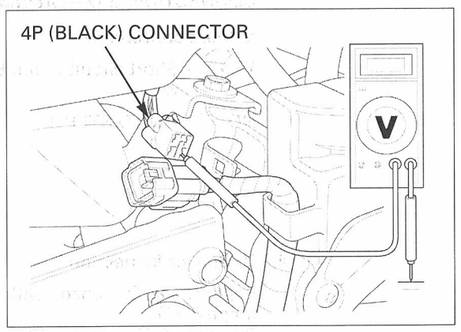
Turn the ignition switch "ON".
Measure the voltage at the O_2 sensor 4P (Black) connector of wire harness side.

CONNECTION: Red/Black (+) – Ground (–)

Does the battery voltage exit?

NO – Open or short circuit in the Red/Black wire.

YES – GO TO STEP 3.



3. O_2 Sensor Heater Open circuit Inspection 2

Turn the ignition switch "OFF".

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

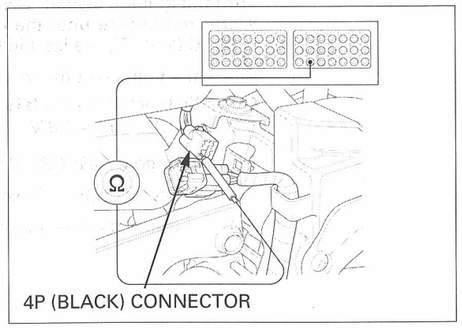
Check for continuity between the test harness terminal and O_2 sensor 4P (Black) connector of the wire harness side.

CONNECTION: A16 – White

Is there continuity?

NO – Open circuit in White wire.

YES – GO TO STEP 4.



4. O_2 Sensor Heater Short circuit Inspection

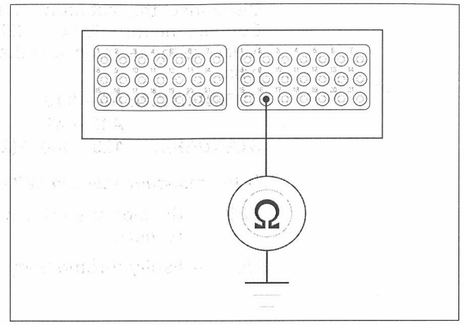
Check for continuity between the test harness terminal and ground.

Connection: A16 – Ground

Is there continuity?

YES – Short circuit in the White wire.

NO – Replace the ECM with a new one, and recheck.



MIL 29 BLINKS (IAC VALVE)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the MIL blinking.

1. IAC Valve Short Circuit Inspection

Remove the floor step (page 3-7).

Turn the ignition switch "OFF".
Disconnect the throttle body 32P connector.

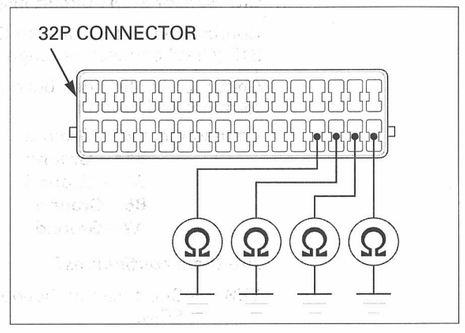
Check for continuities between the throttle body 32P connector and ground.

Connection: Black/Brown – Ground
Brown/Green – Ground
Green/Red – Ground
Green/Orange – Ground

Are there continuities?

YES – • Short circuit in Black/Brown or Brown/Green wire.
• Short circuit in Green/Red or Green/Orange wire.

NO – GO TO STEP 2.



2. IAC Valve Circuit Continuity Inspection

Connect the test harness to ECM 21P (Black) and 21P (Gray) connector (page 6-10).

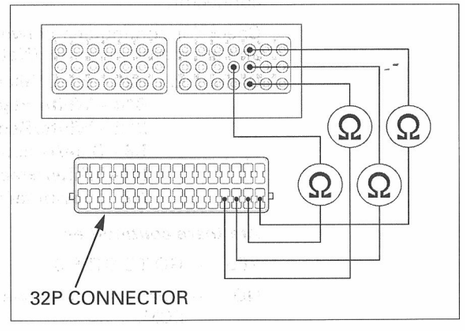
Check for continuities between the test harness and the throttle body 32P connector.

Connection: A5 – Black/Brown
A12 – Brown/Green
A19 – Green/Red
A11 – Green/Orange

Are there continuities?

YES – GO TO STEP 3.

NO – • Open or loose contact in Black/Brown or Green/Red wire.
• Open or loose contact in Brown/Green or Green/Orange wire.



3. IAC Valve Resistance Inspection

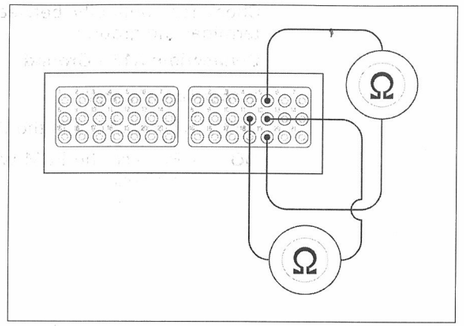
Disconnect the test harness from the ECM.
Connect the throttle body 32P connector.
Measure the resistance at the test harness terminals.

CONNECTION: A5 – A19
A12 – A11
STANDARD: 120 – 140 Ω (20° C/68° F)

Is the resistance within 120 – 140 Ω (20° C/68° F)?

YES – Replace the ECM with a new one, and recheck.

NO – Faulty throttle body (IAC valve).



MIL 52 BLINKS (CKP SENSOR/ALTERNATOR)

- Before starting the inspection, check for loose or poor contact on the alternator/starter 6P (Natural) connector and recheck the MIL blinking.

1. CKP Sensor Short Circuit Inspection

Connect the test harness to ECM 21P (Black) and 21P (Gray) connectors (page 6-10).

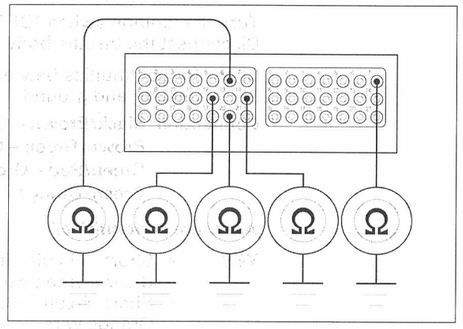
Check for continuities between the test harness terminal and ground.

Connection: B20 – Ground
B14 – Ground
B12 – Ground
B6 – Ground
A7 – Ground

Are there continuities?

YES – Short circuit between the starter and ECM.

NO – GO TO STEP 2.



2. CKP Sensor Circuit Inspection

Disconnect the alternator/starter 6P (Natural) connector.

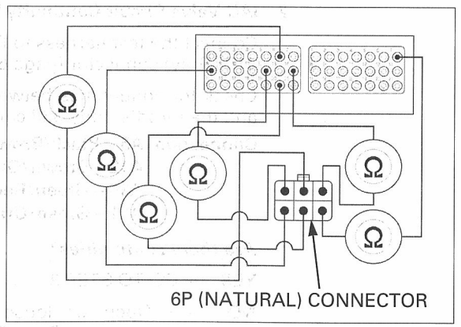
Check for continuities between the test harness and alternator/starter 6P (Natural) connector.

Connection: B20 – Blue/Yellow
B14 – White/Black
B12 – White/Red
B8 – Blue/Green
B6 – White/Green
A7 – Brown/Yellow

Are there continuities?

YES – GO TO STEP 3.

NO – Open circuit between the starter and ECM.



3. ECM Output Voltage (CKP Sensor Power Line) Inspection

Measure the battery voltage (page 16-6).

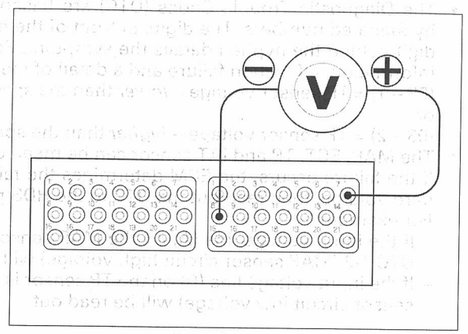
Connect the alternator/starter 6P (Natural) connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: A7 (+) – B8 (–)
STANDARD: Battery voltage: actual value – about 2.0 V (20° C/68° F)

Is the voltage about 2.0 V?

YES – GO TO STEP 4.

NO – GO TO STEP 5.



4. CKP Sensor Output Voltage Inspection

Remove the belt case cover (page 10-6).

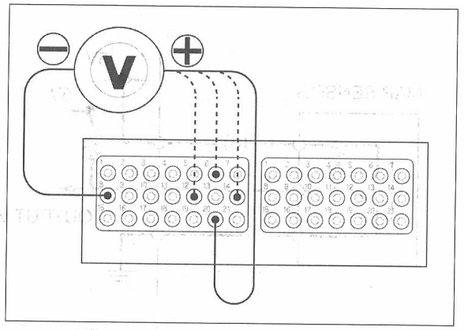
Measure the voltage at the test harness terminals with turning the crankshaft.

CONNECTION: B20 (+) – B8 (–)
B14 (+) – B8 (–)
B12 (+) – B8 (–)
B6 (+) – B8 (–)
STANDARD: Repeat no voltage (below 0.5 V) to exist voltage (5 – 10 V)

Are the voltages at the standard value?

YES – Faulty alternator/stator.

NO – GO TO STEP 6.



5. ECM Power/Ground Line Inspection

Check the ECM power/ground line (page 6-67).

Is the ECM normally?

YES – Replace the ECM with a new one, and recheck.

NO – Replace or repair the abnormal circuit.

6. Alternator/Stator Inspection

Remove the alternator/stator (page 12-4).

Check the stator and flywheel for wear or damage in visual.

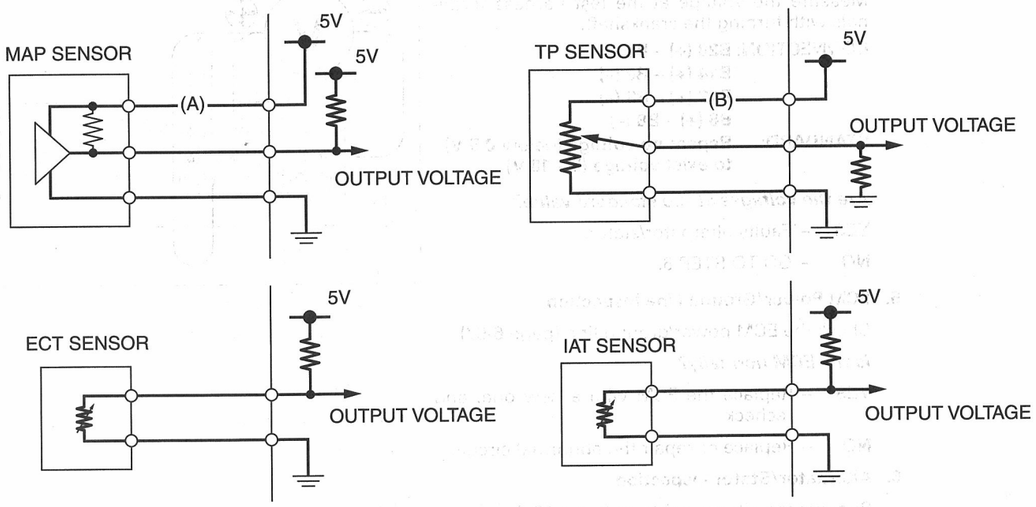
Are the stator and the flywheel normally?

YES – Replace the stator and flywheel.

NO – Replace the abnormal parts.

DTC CODE INDEX

- The Diagnostic Trouble Codes (DTC) are based upon Malfunction Indicator Lamp (MIL) codes and are displayed as hyphenated numbers. The digits in front of the hyphen are equal to an MIL code and indicate the Function Failure. The digit behind the hyphen details the symptom. For example, in the case of the TP sensor, the ECM stores two levels of information, a function failure and a detail of the symptom:
  (08 – 1) = TP sensor voltage – *lower* than the specified value
  or
  (08 – 2) = TP sensor voltage – *higher* than the specified value.
- The MAP, ECT, TP and IAT sensor can be mean diagnosis according to the sensor output voltage value.
  If the failure occurs, the ECM determines the failure function, the output voltage is high or low compared to the standard voltage, then read out the DTC to the HDS pocket tester.
  For example:
  – If the input voltage line (A) on the MAP sensor is opened, the ECM detects the output voltage is about 5 V, then the DTC 1-2 (MAP sensor circuit high voltage) will be read out.
  – If the input voltage line (B) on the TP sensor is opened, the ECM detects the output voltage is 0 V, then the DTC 8-1 (TP sensor circuit low voltage) will be read out.



DTC	Detection Item	Causes	Symptoms	Refer to
–	ECM malfunction	• Faulty ECM	• Engine does not start • MIL does not blink	–
–	ECM power input circuit malfunction	• Blown sub-fuse (15 A) (Starter/ignition/fuel pump) • Open circuit at the power input wire of the ECM • Open circuit in bank angle sensor related circuit • Faulty bank angle sensor • Open circuit in main relay related wires • Faulty main relay • Faulty ignition switch	• Engine does not start • MIL does not blink	6-67
–	MIL circuit malfunction	• Faulty ECM • Open or short circuit in MIL wire	• Engine operates normally • MIL does not blink	–
–	Data link circuit malfunction	• Short circuit in data link connector • Faulty ECM	• Engine operates normally • MIL stays lit	–
1-1	MAP sensor circuit low voltage	• Short circuit in MAP sensor wire • Faulty MAP sensor	• Engine operates normally	6-31
1-2	MAP sensor circuit high voltage	• Loose or poor contact on throttle body 32P connector • Open circuit in MAP sensor wire • Faulty MAP sensor	• Engine operates normally	6-32
7-1	ECT sensor circuit low voltage	• Short circuit in ECT sensor wire • Faulty ECT sensor	• Hard start at a low temperature (Simulate using numerical values; 90 °C/194 °F) • Low engine speed • Coolant temperature indicator turns on	6-33
7-2	ECT sensor circuit high voltage	• Loose or poor contact on ECT sensor 2P (Black) connector • Open circuit in ECT sensor wire • Faulty ECT sensor	• Hard start at a low temperature (Simulate using numerical values; 90 °C/194 °F) • Low engine speed • Coolant temperature indicator turns on	6-34
8-1	TP sensor circuit low voltage	• Short circuit in TP sensor wire • Faulty TP sensor	• Poor engine performance and response when operating the throttle quickly (Simulate using numerical values; Throttle opens 0°)	6-35
8-2	TP sensor circuit high voltage	• Loose or poor contact on throttle body 32P connector • Open circuit in TP sensor wire • Faulty TP sensor	• Poor engine performance and response when operating the throttle quickly (Simulate using numerical values; Throttle opens 0°)	6-36
9-1	IAT sensor circuit low voltage	• Short circuit in IAT sensor wire • Faulty IAT sensor	• Engine operates normally (Simulate using numerical values; 25 °C/77 °F)	6-37
9-2	IAT sensor circuit high voltage	• Loose or poor contact on throttle body 32P connector • Open circuit in IAT sensor wire • Faulty IAT sensor	• Engine operates normally (Simulate using numerical values; 25 °C/77 °F)	6-38
12-1	Injector circuit malfunction	• Loose or poor contact on injector 2P (Black) connector • Open or short circuit in injector wire • Faulty injector	• Engine does not start	6-38

DTC	Detection Item	Causes	Symptoms	Refer to
21-1	O_2 sensor circuit malfunction	• Loose or poor contact on O_2 sensor 4P (Natural) connector • Open or short circuit in O_2 sensor wire • Faulty O_2 sensor	• Engine operates normally	6-40
23-1	O_2 sensor heater malfunction	• Loose or poor contact on O_2 sensor 4P (Natural) connector • Open or short circuit in O_2 sensor heater wire • Faulty O_2 sensor	• Engine operates normally	6-41
29-1	Idle air control (IAC) valve malfunction	• Loose or poor contact on throttle body 32P connector • Open or short circuit in IAC valve wire • Faulty IAC valve	• Poor performance at idle speed	6-42
52-1	Crankshaft position (CKP) sensor malfunction	• Loose or poor contact on alternator/stator 6P (Natural) connector • Open or short circuit in CKP sensor wire • Faulty CKP sensor	• Engine does not start • Starter motor does not operate	6-44
52-2	Alternator malfunction	• Loose or poor contact on alternator/stator 6P (Natural) connector • Open or short circuit in alternator wire • Faulty alternator	• Engine does not start • Starter motor does not operate	6-44

DTC TROUBLESHOOTING

DTC 1-1 (MAP SENSOR LOW VOLTAGE)

1. MAP Sensor System Inspection

Turn the ignition switch "ON".
Check the MAP sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the throttle body 32P connector.

2. MAP Sensor Input voltage Inspection

Turn the ignition switch "OFF".
Disconnect the throttle body 32P connector.

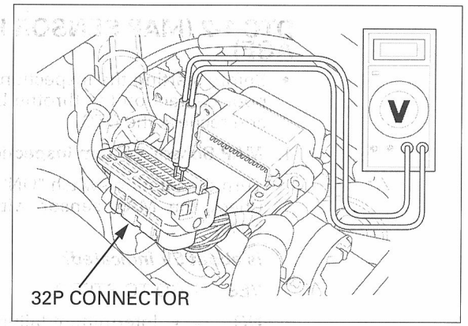
Turn the ignition switch "ON".
Measure the voltage at the throttle body 32P connector wire harness side.

CONNECTION: Yellow/Red (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V

Is the voltage within 4.75 - 5.25 V?

YES – GO TO STEP 4.

NO – GO TO STEP 3.



3. MAP Sensor Input Line Inspection

Turn the ignition switch "OFF".
Disconnect the ECM 21P (Gray) connector.
Check for continuity between the ECM 21P (Gray) connector wire harness side and throttle body 32P connector wire harness side.

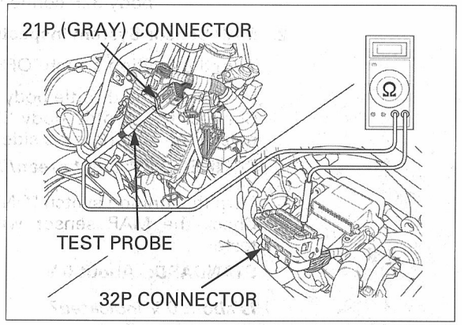
CONNECTION: Yellow/Red – Yellow/Red

TOOL:
Test probe **07ZAJ-RDJA110**

Is there continuity?

YES – Replace the ECM with a new one, and recheck.

NO – Open circuit in Yellow/Red wire.



4. MAP Sensor Output Line Short Circuit Inspection

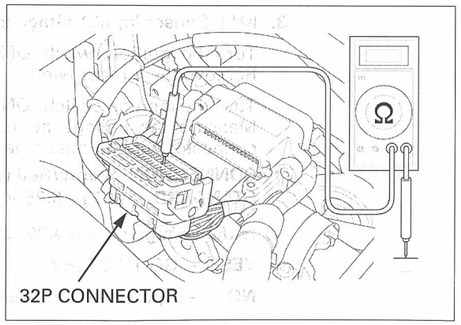
Check for continuity between the throttle body 32P connector wire harness side and ground.

CONNECTION: Light green/Yellow – Ground

Is there continuity?

YES – Short circuit in Light green/Yellow wire

NO – GO TO STEP 5.



5. **MAP Sensor Inspection**

Replace the throttle body with a new one (page 6-55)
Connect the ECM 21P (Gray) connector and throttle body 32P connector.
Reset the ECM (page 6-10).

Turn the ignition switch "ON".
Check the MAP sensor with the HDS pocket tester.

Is the DTC 1-1 indicated?

YES – Replace the ECM with a new one, and recheck.

NO – Faulty original throttle body (MAP sensor).

DTC 1-2 (MAP SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the DTC.

1. **MAP Sensor System Inspection 1**

Turn the ignition switch "ON".
Check the MAP sensor with the HDS pocket tester.

Is about 5V indicated?

YES – GO TO STEP 2.

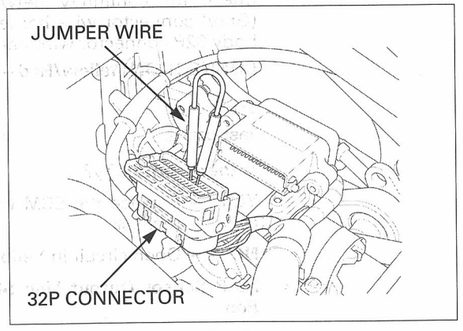
NO – • Intermittent failure.
• Loose or poor contact on the throttle body 32P connector.

2. **MAP Sensor System Inspection 2**

Turn the ignition switch "OFF".

Disconnect the throttle body 32P connector.
Connect the throttle body 32P connector terminals at the wire harness side with a jumper wire.

CONNECTION: Light green/Yellow – Green/Blue



Turn the ignition switch "ON".
Check the MAP sensor with the HDS pocket tester.

STANDARD: About 0 V

Is about 0 V indicated?

YES – Faulty throttle body (MAP sensor).

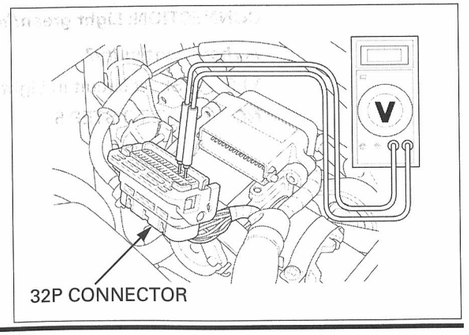
NO – GO TO STEP 3.

3. **MAP Sensor Input Voltage Inspection**

Turn the ignition switch "OFF".
Remove the jumper wire.

Turn the ignition switch "ON".
Measure the voltage at the throttle body 32P connector wire harness side.

CONNECTION: Yellow/Red (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V



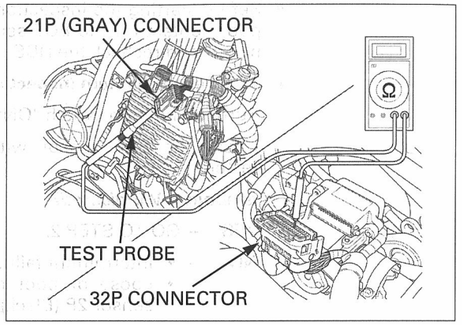
Is the voltage within 4.75 - 5.25 V?

YES – GO TO STEP 4.

NO – Open circuit in Green/Blue wire.

4. **MAP Sensor Output Line Open Circuit Inspection**

Disconnect the ECM 21P (Gray) connector.



Check for continuity between the ECM 21P (Gray) connector of the wire harness side and throttle body 32P connector of the wire harness side.

CONNECTION: Light green/Yellow – Light green/Yellow

TOOL:
Test probe **07ZAJ-RDJA110**

Is there continuity?

YES – Replace the ECM with a new one, and recheck.

NO – Open circuit in Light green/Yellow wire.

DTC 7-1 (ECT SENSOR LOW VOLTAGE)

1. **ECT Sensor System Inspection**

Turn the ignition switch "ON".

Check the ECT sensor with the HDS pocket tester.

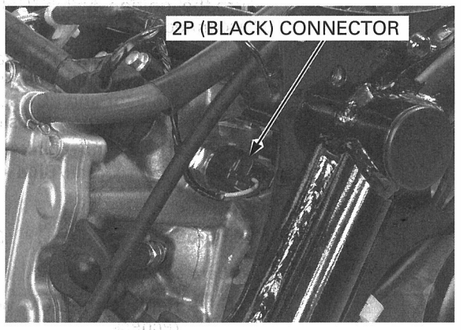
Is about 0 V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the ECT sensor 2P (Black) connector.

2. **ECT Sensor Inspection**

Turn the ignition switch "OFF".
Disconnect the ECT sensor 2P (Black) connector.



Turn the ignition switch "ON".
Check the ECT sensor with the HDS pocket tester.

Is about 0 V indicated?

YES – Faulty ECT sensor.

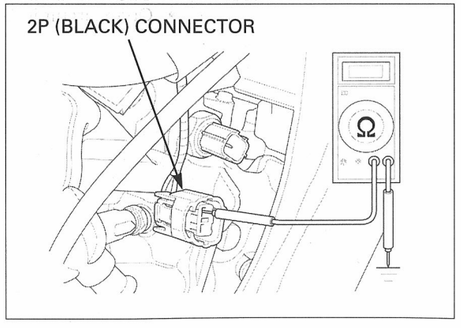
NO – GO TO STEP 3.

3. **ECT Sensor Output Line Short Circuit Inspection**

Turn the ignition switch "OFF".

Check for continuity between the ECT sensor 2P (Black) connector terminal of the wire harness side and ground.

CONNECTION: Pink – Ground



Is there continuity?

YES – Short circuit in Pink wire.

NO – Replace the ECM with a new one, and recheck.

DTC 7-2 (ECT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the ECT sensor 2P (Black) connector and recheck the HDS pocket tester.

1. **ECT Sensor System Inspection**

   Turn the ignition switch "ON".

   Check the ECT sensor with the HDS pocket tester.

   Is about 5 V indicated?

   YES – GO TO STEP 2.

   NO – • Intermittent failure.
   • Loose or poor contact on the ECT sensor 2P (Black) connector.

2. **ECT Sensor Inspection**

   Turn the ignition switch "OFF".

   Disconnect the ECT sensor 2P (Black) connector.
   Connect the ECT sensor 2P (Black) connector terminals with a jumper wire.

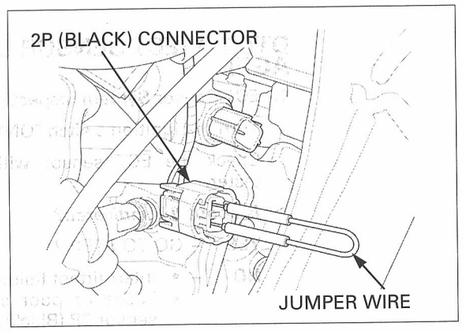
   CONNECTION: Pink – Green/Blue

   Turn the ignition switch "ON".
   Check the ECT sensor with the HDS pocket tester.

   Is about 0 V indicated?

   YES – Faulty ECT sensor.

   NO – GO TO STEP 3.



3. **ECT Sensor Output Line Inspection**

   Turn the ignition switch "OFF".
   Disconnect the jumper wire.

   Disconnect the ECM 21P (Gray) connector.
   Check for continuity between the ECM 21P (Gray) connector and ECT sensor 2P (Black) connector of the wire harness side.

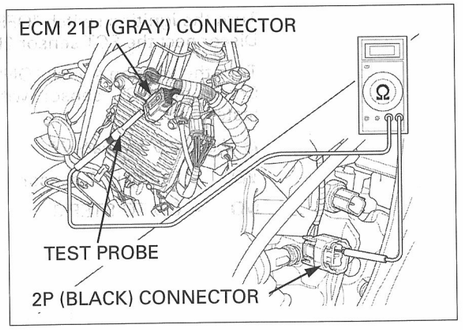
   CONNECTION: Pink – Pink
   Green/Blue – Green/Blue

   TOOL:
   Test probe **07ZAJ-RDJA110**

   Is there continuities?

   YES – Replace the ECM with a new one, and recheck.

   NO – • Open circuit in Pink wire.
   • Open circuit in Green/Blue wire.



DTC 8-1 (TP SENSOR LOW VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the HDS pocket tester.

1. **TP Sensor System Inspection**

   Turn the ignition switch "ON".

   Check the TP sensor with the HDS pocket tester when the throttle fully closed.

   Is about 0V indicated?

   YES – • Intermittent failure.
   • Loose or poor contact on the throttle body 32P connector.

   NO – GO TO STEP 2.

2. **TP Sensor Input voltage**

   Turn the ignition switch "OFF".
   Disconnect the throttle body 32P connector.

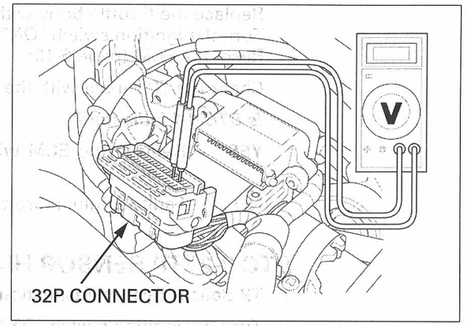
   Turn the ignition switch "ON".
   Measure the voltage at the throttle body 32P connector terminals of the wire harness side.

   CONNECTION: Yellow/Red (+) – Green/Blue (–)
   STANDARD: 4.75 – 5.25 V

   Is the voltage within 4.75 - 5.25 V?

   YES – GO TO STEP 4.

   NO – GO TO STEP 3.



3. **TP Sensor Circuit Inspection**

   Disconnect the ECM 21P (Gray) connector.
   Check for continuity between the ECM 21P (Gray) connector and throttle body 32P connector.

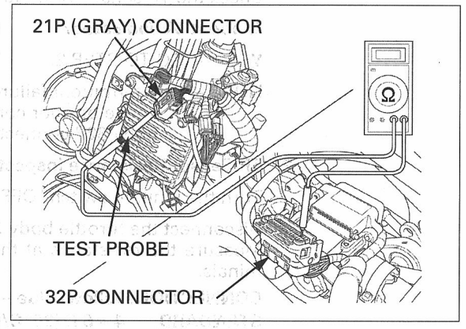
   CONNECTION: Yellow/Red – Yellow/Red

   TOOL:
   Test probe **07ZAJ-RDJA110**

   Is there continuity?

   YES – Replace the ECM with a new one, and recheck.

   NO – Open circuit in Yellow/Red wire.



4. **TP Sensor Output Line Open Circuit Inspection**

   Turn the ignition switch "OFF".

   Check for continuity between the ECM 21P (Gray) connector and throttle body 32P connector.

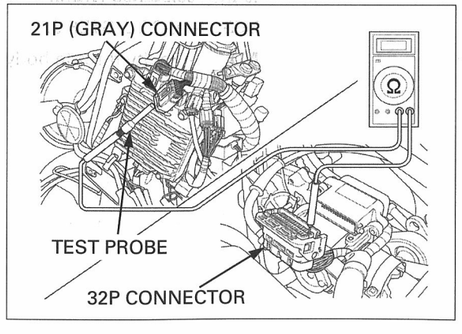
   CONNECTION: Yellow/Blue – Yellow/Blue

   TOOL:
   Test probe **07ZAJ-RDJA110**

   Is there continuity?

   YES – GO TO STEP 5.

   NO – Open circuit in Yellow/Blue wire.



5. TP Sensor Output Line Open Circuit Inspection

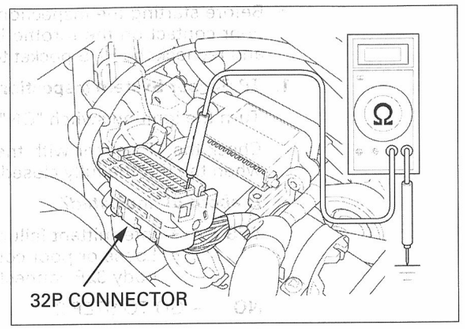
Check for continuity between the throttle body 32P connector terminal of the wire harness side and ground.

CONNECTION: Yellow/Blue – Ground

Is there continuity?

YES – Short circuit in Yellow/Blue wire.

NO – GO TO STEP 6.



6. TP Sensor Output Line Short Circuit Inspection

Replace the throttle body with a new one.
Turn the ignition switch "ON".
Reset the ECM (page 6-10).

Check the TP sensor with the HDS pocket tester.

Is DTC 8-1 indicated?

YES – Replace the ECM with a new one, and recheck.

NO – Faulty original throttle body (TP sensor)

DTC 8-2 (TP SENSOR HIGH VOLTAGE)

1. TP Sensor System Inspection

Turn the ignition switch "ON".

Check the TP sensor with the HDS pocket tester.

Is about 5V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the throttle body 32P connector.

2. TP Sensor Resistance Inspection

Turn the ignition switch "OFF".

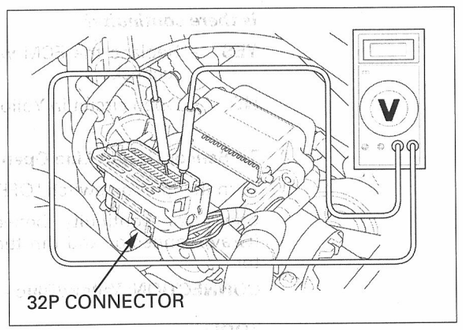
Disconnect the throttle body 32P connector.
Measure the resistance at the throttle body terminals.

CONNECTION: Yellow/Blue – Green/Blue
STANDARD: 4 – 6 Ω (20° C/68° F)

Is the resistance within 4 - 6 Ω (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty throttle body (TP sensor).



3. TP Sensor Input Voltage Inspection

Turn the ignition switch "ON".

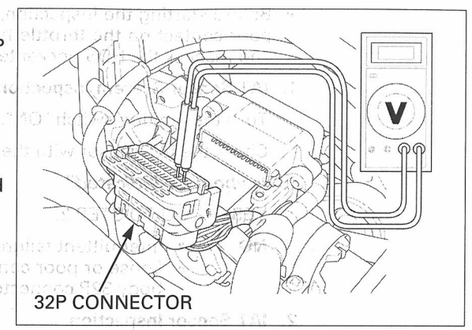
Measure the voltage at the throttle body 32P connector terminals of the wire harness side.

CONNECTION: Yellow/Red (+) – Green/Blue (–)
STANDARD: 4.75 – 5.25 V

Is the voltage 4.75 - 5.25 V?

YES – Replace the ECM with a new one, and recheck.

NO – Open circuit in Green/Blue wire.



DTC 9-1 (IAT SENSOR LOW VOLTAGE)

1. IAT Sensor System Inspection

Turn the ignition switch "ON".

Check the IAT sensor with the HDS pocket tester.

Is about 0V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the throttle body 32P connector.

2. IAT Sensor Inspection

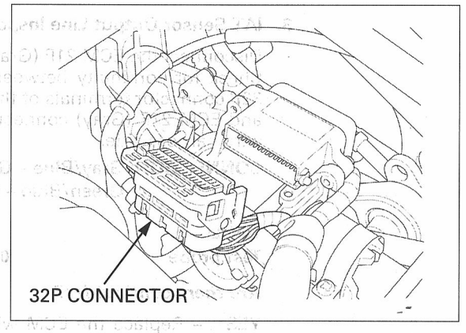
Turn the ignition switch "OFF".

Disconnect the throttle body 32P connector.
Turn the ignition switch "ON".
Check the IAT sensor with the HDS pocket tester.

Is about 0V indicated?

YES – GO TO STEP 3.

NO – Faulty throttle body (IAT sensor).



3. IAT Sensor Output Line Short Circuit Inspection

Turn the ignition switch "OFF".

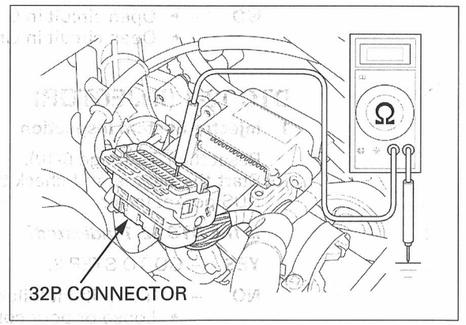
Check for continuity between the throttle body 32P connector terminal of the wire harness side and ground.

CONNECTION: Gray/Blue – Ground

Is there continuity?

YES – Short circuit in Gray/Blue wire.

NO – Replace the ECM with a new one, and recheck.



DTC 9-2 (IAT SENSOR HIGH VOLTAGE)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the HDS pocket tester.

1. IAT Sensor System Inspection

Turn the ignition switch "ON".

Check the IAT sensor with the HDS pocket tester.

Is about 5V indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the throttle body 32P connector.

2. IAT Sensor Inspection

Turn the ignition switch "OFF".

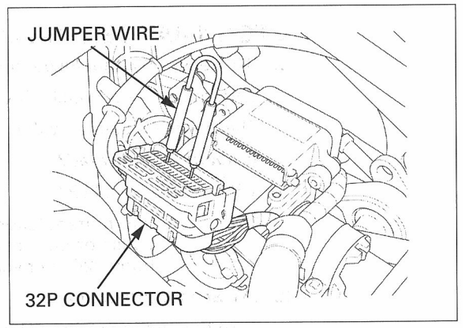
Disconnect the throttle body 32P connector.
Connect the throttle body 32P connector terminals with a jumper wire.
CONNECTION: Gray/Blue – Green/Blue

Turn the ignition switch "ON".
Check the IAT sensor with the HDS pocket tester.

Is about 0V indicated?

YES – Faulty throttle body (IAT sensor)

NO – GO TO STEP 3.



3. IAT Sensor Output Line Inspection

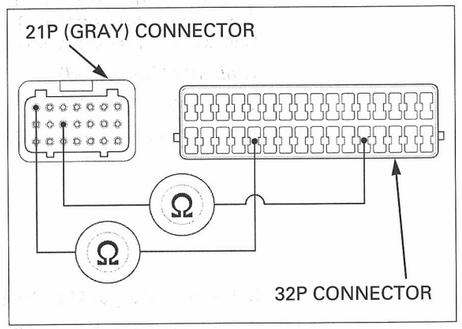
Disconnect the ECM 21P (Gray) connector.
Check for continuity between the throttle body 32P connector terminals of the wire harness side and ECM 21P (Gray) connector terminals of the wire harness side.
CONNECTION: Gray/Blue – Gray/Blue
Green/Blue – Green/Blue

TOOL:
Test probe **07ZAJ-RDJA110**

Are there continuities?

YES – Replace the ECM with a new one, and recheck.

NO – • Open circuit in Gray/Blue wire.
• Open circuit in Green/Blue wire.



DTC 12-1 (INJECTOR)

1. Injector System Inspection

Reset the DTC (page 6-10).
Start the engine and check the injector with the HDS pocket tester.

Is the DTC 12-1 indicated?

YES – GO TO STEP 2.

NO – • Intermittent failure.
• Loose or poor contact on the injector 2P connector.

2. Injector Circuit Resistance Inspection

Turn the ignition switch "OFF".

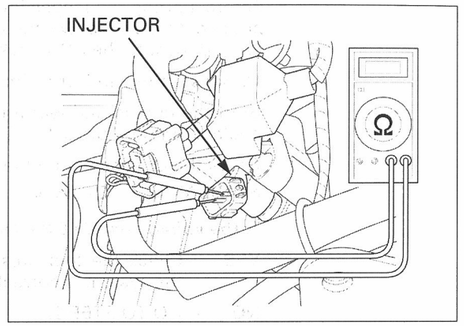
Disconnect the injector 2P (Black) connector.

Measure the resistance at the injector connector terminals.
CONNECTION: Red/Blue – Pink/Blue
STANDARD: 11.1 – 12.3 kΩ (20°C/68°F)

Is the resistance within 11.1 - 12.3 kΩ (20°C/68°F)?

YES – GO TO STEP 3.

NO – Faulty injector.



3. Injector Input Voltage Inspection

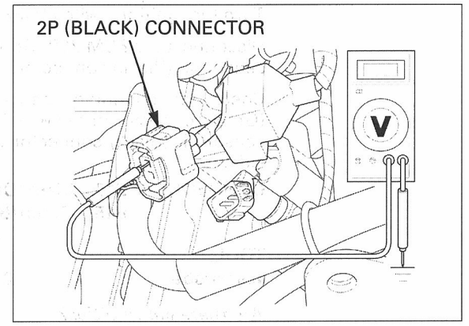
Turn the ignition switch "ON".

Measure the voltage between the injector connector of the wire harness side and ground.
CONNECTION: Red/Black (+) – Ground (–)

Does the battery voltage exit?

YES – GO TO STEP 4.

NO – • Open circuit in Red/Black wire.
• Faulty main relay.
• Replace the ECM with a new one, and recheck.



4. Injector Signal Line Short Circuit Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 21P (Black) connector.

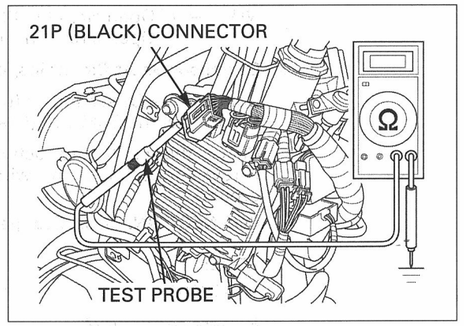
Check for continuity between the ECM 21P (Black) connector of the wire harness side and ground.
CONNECTION: Pink/Blue – Ground

TOOL:
Test probe **07ZAJ-RDJA110**

Is there continuity?

YES – Short circuit in Pink/Blue wire.

NO – GO TO STEP 5.



5. Injector Signal Line Open Circuit Inspection

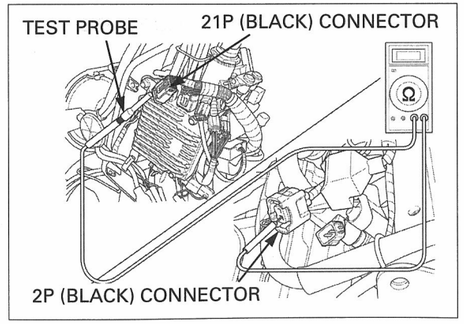
Check for continuity between the ECM 21P (Black) connector of the wire harness side and injector 2P (Black) connector of the wire harness side.
CONNECTION: Pink/Blue – Pink/Blue

TOOL:
Test probe **07ZAJ-RDJA110**

Is there continuity?

YES – Replace the ECM with a new one, and recheck

NO – Open circuit in Pink/Blue wire.



DTC 21-1 (O_2 SENSOR)

- Before starting the inspection, check for loose or poor contact on the O_2 sensor 4P (Black) connector and recheck the HDS pocket tester.

1. O_2 Sensor System Inspection

Start the engine and warm up the engine up to coolant temperature is 80 °C (176 °F).

Check the O_2 sensor with the HDS pocket tester.

STANDARD: 0.3 – 0.6 V

Is the voltage within 0.3 - 0.6V?

YES – Check the fuel pressure (page 6-49). If the system is correct, GO TO STEP 3.

NO – GO TO STEP 2.

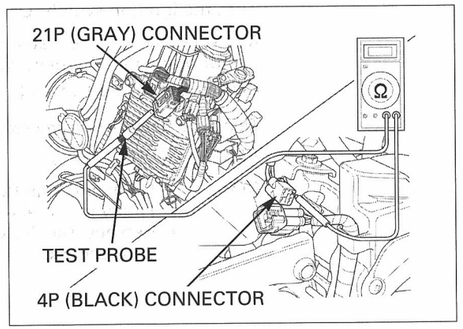
2. O_2 Sensor Open Circuit Inspection

Turn the ignition switch "OFF".

Disconnect the ECM 21P (Gray) connector and O_2 sensor 4P (Black) connector.

Check for continuity between the ECM 21P (Gray) connector of the wire harness side and O_2 sensor 4P (Black) connector of the wire harness side.

CONNECTION: B17 – Black/Orange
B15 – Green/Blue



TOOL:
Test probe 07ZAJ-RDJA110

Are there continuities?

YES – GO TO STEP 3.

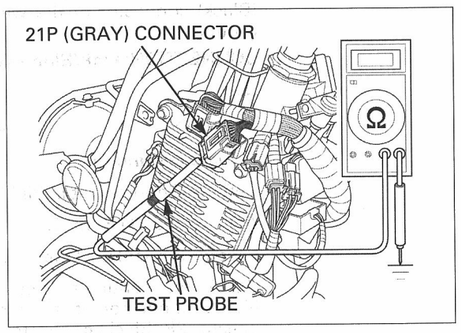
NO – • Open circuit in Black/Orange wire.
• Open circuit in Green/Blue wire.

3. O_2 Sensor Short Circuit Inspection

Connect the O_2 sensor 4P (Black) connector and Disconnect the ECM 21P (Gray) connector.

Check the continuity between the ECM 21P (Gray) connector of the wire harness side and ground.

CONNECTION: Black/Orange – Ground



TOOL:
Test probe 07ZAJ-RDJA110

Is there continuity?

YES – Short circuit in Black/Orange wire

NO – GO TO STEP 4.

4. O_2 Sensor Inspection

Replace the O_2 sensor with a new one (page 6-72).
Reset the ECM (page 6-10).

Start the engine and warm up the engine up to coolant temperature is 80 °C (176 °F).

Check the O_2 sensor with the HDS pocket tester.

STANDARD: 0.3 – 0.6 V

Is the voltage within 0.3 - 0.6 V?

YES – Faulty original O_2 sensor.

NO – Check the fuel supply system.

DTC 23-1 (O_2 SENSOR HEATER)

- Before starting the inspection, check for loose or poor contact on the O_2 sensor 4P (Black) connector and recheck the HDS pocket tester.

1. O_2 Sensor Heater System Inspection

Reset the DTC (page 6-10).

Start the engine and check the O_2 sensor heater with the HDS pocket tester.

Is the DTC 23-1 indicated?

YES – GO TO STEP 2.

NO – • Loose or poor contact on the O_2 sensor 4P (Black) connector.
• Intermittent failure.

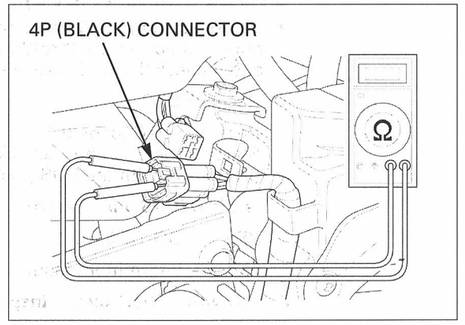
2. O_2 Sensor Heater Resistance Inspection

Turn the ignition switch "OFF".

Disconnect the O_2 sensor 4P (Black) connector.

Measure the resistance at the O_2 sensor 4P (Black) connector terminals of the sensor side.

CONNECTION: White – White



Is the resistance within 10 - 40 Ω(20°C/68°F)?

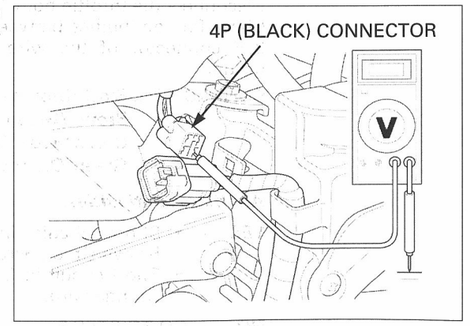
YES – GO TO STEP 3.

NO – Faulty O_2 sensor.

3. O_2 Sensor Heater Power Input Line Inspection

Turn the ignition switch "ON" then measure the voltage between the O_2 sensor 4P (Black) connector of the wire harness side and ground.

CONNECTION: Red/Black (+) – Ground (–)



Does the battery voltage exit?

YES – GO TO STEP 4.

NO – Open circuit in the Red/Black wire.

4. **O_2 Sensor Heater Open circuit Inspection**

Turn the ignition switch "OFF".

Disconnect the ECM 21P (Black) connector.

Check for continuity between the ECM 21P (Black) connector and O_2 sensor 4P (Black) connector of the wire harness side.

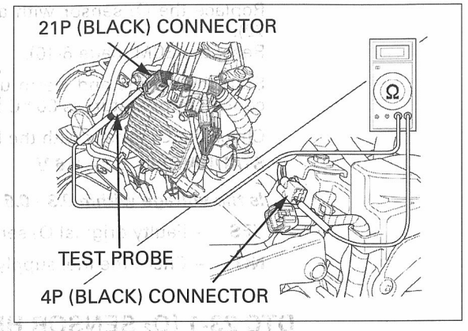
CONNECTION: White – White

TOOL:
Test probe **07ZAJ-RDJA110**

Is there continuity?

YES – GO TO STEP 5.

NO – Open circuit in White wire.



5. **O_2 Sensor Heater Short circuit Inspection**

Connect the ECM 21P (Black) connector.

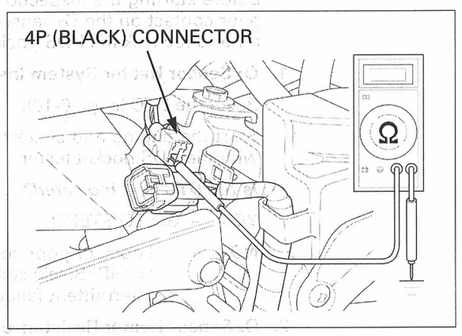
Check for continuity between the O_2 sensor 4P (Black) connector of the wire harness side and ground.

CONNECTION: White – Ground

Is there continuity?

YES – Short circuit in White wire.

NO – Replace the ECM with a new one, and recheck.



DTC 29-1 (IAC VALVE)

- Before starting the inspection, check for loose or poor contact on the throttle body 32P connector and recheck the HDS pocket tester.

1. **Recheck DTC**

Reset the DTC (page 6-10).
Start the engine and recheck the idle air control (IAC) valve with the HDS pocket tester.

Is the DTC 29-1 indicated?

YES – GO TO STEP 2.

NO – Intermittent failure.

2. **IAC Valve Short Circuit Inspection**

Turn the ignition switch "OFF".

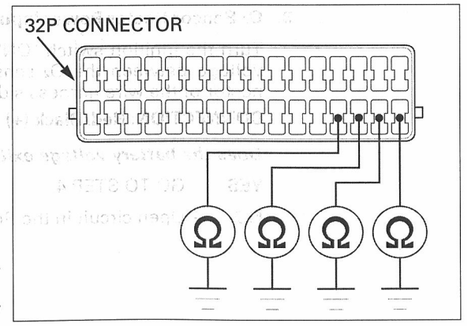
Disconnect the throttle body 32P connector.
Check for continuities between the throttle body 32P connector of the wire harness side and ground.

CONNECTION: Black/Brown – Ground
Brown/Green – Ground
Green/Red – Ground
Green/Orange – Ground

Are there continuities?

YES – • Short circuit in Black/Brown or Brown/Green wire.
• Short circuit in Green/Red or Green/Orange wire.

NO – GO TO STEP 3.



3. **IAC Valve Circuit Continuity Inspection**

Disconnect the ECM 21P (Black) connector.

Check for continuities between the ECM 21P (Black) connector of the wire harness side and throttle body 32P connector of the wire harness side.

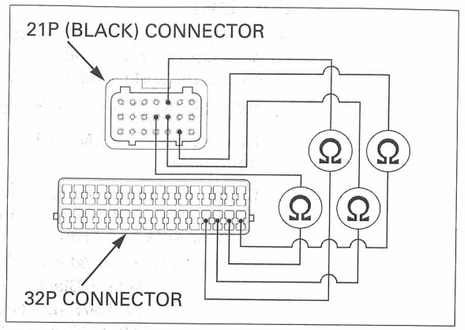
CONNECTION: Black/Brown – Black/Brown
Brown/Green – Brown/Green
Green/Red – Green/Red
Green/Orange – Green/Orange

TOOL:
Test probe **07ZAJ-RDJA110**

Are there continuities?

YES – GO TO STEP 4.

NO – • Open or loose contact in Black/Brown wire or Green/Red wire.
• Open or loose contact in Brown/Green or Green/Orange wire.



4. **IAC Valve Resistance Inspection**

Connect the throttle body 32P connector.
Measure the resistance at the ECM 21P (Black) connector of the wire harness side.

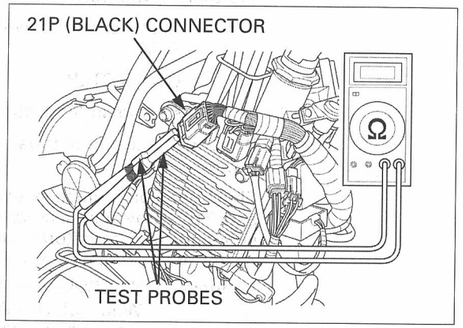
CONNECTION: Black/Brown – Green/Red
Brown/Green – Green/Orange
STANDARD: 120 – 140 Ω (20° C/68° F)

TOOL:
Test probe **07ZAJ-RDJA110**
(two required)

Is the resistance within 120 - 140 Ω (20°C/68°F)?

YES – Replace the ECM with a new one, and recheck.

NO – Faulty throttle body (IAT valve).



DTC 52-1 (CKP SENSOR), 52-2 (ALTERNATOR)

- Before starting the inspection, check for loose or poor contact on the alternator/starter 6P (Natural) connector and recheck the DTC.

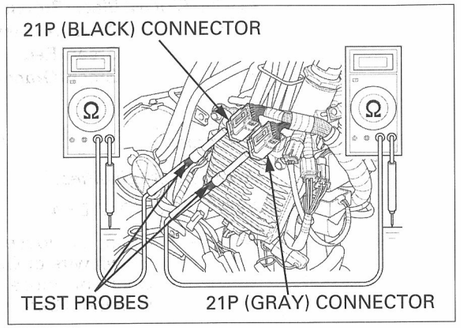
1. CKP Sensor Short Circuit Inspection

Disconnect the ECM 21P (Black) and 21P (Gray) connectors.

Check for continuities between the ECM 21P (Black) and 21P (Gray) connectors of the wire harness side and ground.

Connection: Blue/Yellow – Ground
White/Black – Ground
White/Red – Ground
White/Green – Ground
Brown/Yellow – Ground

TOOL:
Test probe **07ZAJ-RDJA110 (two required)**



Are there continuities?

YES – Short circuit between the stator and ECM.

NO – GO TO STEP 2.

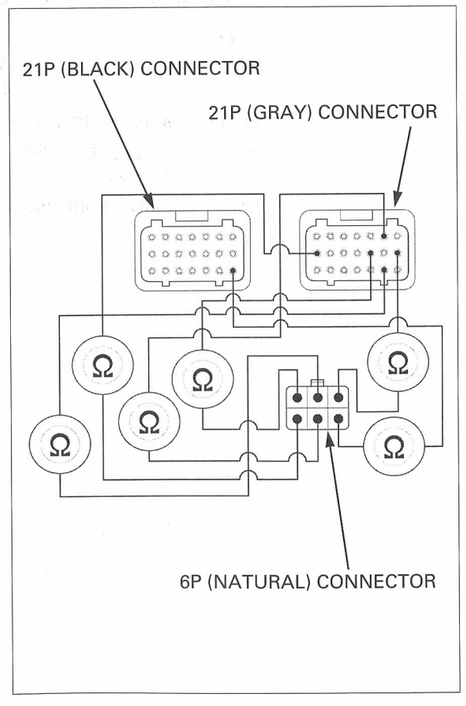
2. CKP Sensor Circuit Inspection

Disconnect the alternator/stator 6P (Natural) connector.

Check for continuities between the 21P (Black) and 21P (Gray) connectors of the wire harness side and the alternator/starter 6P (Natural) connector of the wire harness side.

Connection: Blue/Yellow – Blue/Yellow
White/Black – White/Black
White/Red – White/Red
Blue/Green – Blue/Green
White/Green – White/Green
Brown/Yellow – Brown/Yellow

TOOL:
Test probe **07ZAJ-RDJA110**



Are there continuities?

YES – GO TO STEP 3.

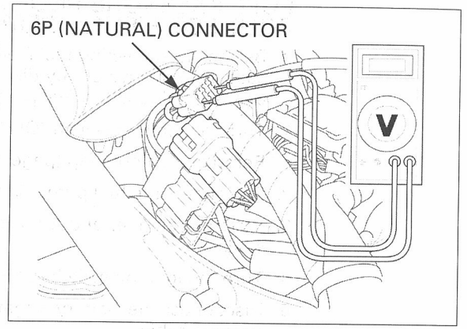
NO – Open circuit between the stator and ECM.

3. ECM Output Voltage (CKP Sensor Power Line) Inspection

Measure the battery voltage (page 16-6).

Connect the alternator/starter 6P (Natural) connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals.

CONNECTION: Brown/Yellow (+) – Blue/Green (–)
STANDARD: Battery voltage: actual value – about 2.0 V (20° C/68° F)



Is the voltage standard value?

YES – GO TO STEP 4.

NO – GO TO STEP 5.

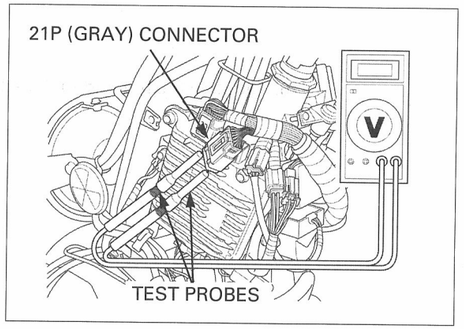
4. CKP Sensor Output Voltage Inspection

Remove the belt case cover (page 10-6).

Disconnect the ECM 21P (Gray) connector.
Measure the voltage at the ECM 21P (Gray) connector terminals of the wire harness side with turning the crankshaft.

CONNECTION: Blue/Yellow (+) – Blue/Green (–)
White/Black (+) – Blue/Green (–)
White/Red (+) – Blue/Green (–)
White/Green (+) – Blue/Green (–)
STANDARD: Repeat no voltage (below 0.5 V) to exist voltage (5 – 10 V)

TOOL:
Test probe **07ZAJ-RDJA110**



Are the voltage at the standard value?

YES – Faulty alternator/starter.

NO – GO TO STEP 6.

5. ECM Power/Ground Line Inspection

Check the ECM power/ground line (page 6-67).

Is the ECM normally?

YES – Replace the ECM with a new one, and recheck.

NO – Replace or repair the abnormal circuit.

6. Alternator/Stator Inspection

Remove the alternator/stator (page 12-4).

Check the stator and flywheel for wear or damage in visual.

Are the stator and the flywheel normally?

YES – Replace the stator and flywheel.

NO – Replace the abnormal parts.

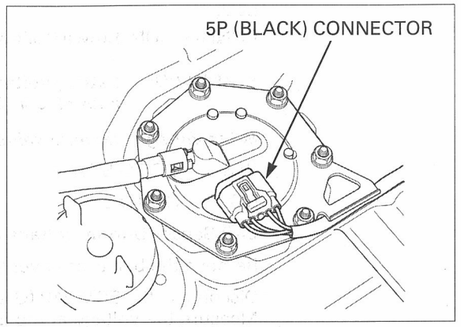
FUEL LINE INSPECTION

FUEL PRESSURE RELIEVING/QUICK CONNECT FITTING REMOVAL

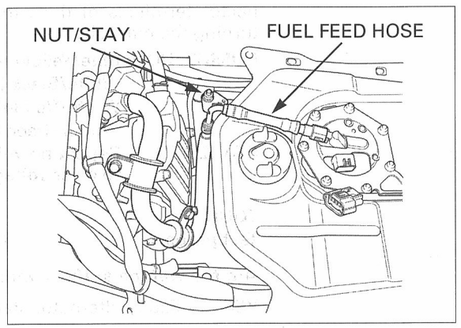
- Before disconnecting fuel feed hose, relieve pressure from the system by disconnecting the quick connect fitting in the fuel pump.

1. Turn the ignition switch "OFF".

   Remove the floor step (page 3-7).
2. Disconnect the fuel pump 5P (Black) connector.
3. Start the engine, and let it idle until the engine stalls.
4. Turn the ignition switch "OFF".
5. Disconnect the battery negative cable and then positive cable.

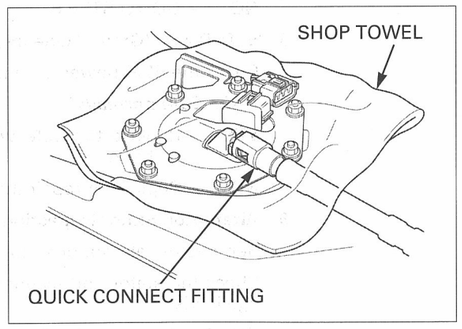


6. Remove the nut and fuel feed hose from the stay.



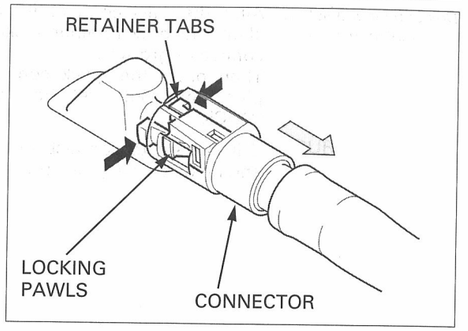
7. Check the fuel quick connect fitting for dirt, and clean if necessary.

   Place a shop towel over the quick connect fitting.

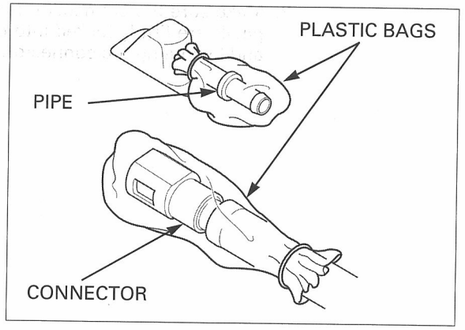


8. Hold the connector with one hand and squeeze the retainer tabs with the other hand release them from the locking pawls.
   Pull the connector off.

- Prevent the remaining fuel in the fuel feed hose from following out with a shop towel.
- Be careful not to damage the hose or other parts.
- Do not use tools.
- If the connector does not move, keep the retainer tabs pressed down, and alternately pull and push the connector until it comes of easily.



9. To prevent damage and keep foreign matter out, cover the disconnected connector and pipe end with the plastic bags.

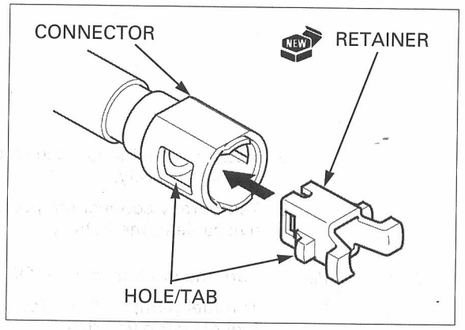


QUICK CONNECT FITTING INSTALLATION

- Always replace the retainer of the quick connect fitting when the fuel feed hose is disconnected.
- If any retainer need replacing, use the same manufacture's retainer as the ones being removed (The several manufactures feature different retainer specifications).

1. Clean around the fuel hose joint.

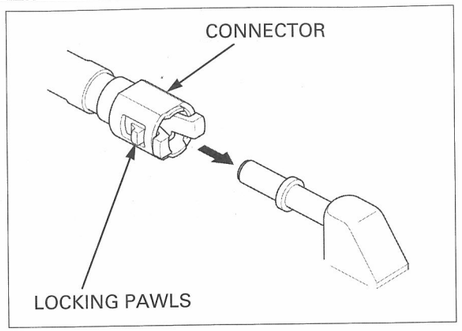
   Insert a new retainer into the connector joint with aligning the two hooks of the retainer with the two holes on the connector joint.



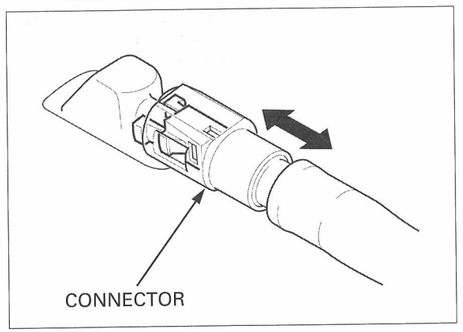
Do not bent or twist fuel feed hose

2. Align the quick connect fitting with the pipe and align the new retainer locking pawls with the connector grooves.
   Then press the quick connect fitting onto the pipe until both retainer pawls lock with a "CLICK".

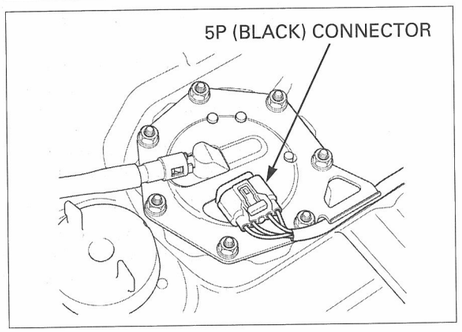
   If it is hard to connect, put a small amount of engine oil on the pipe end.



3. Make sure the connection is secure and that the pawls are firmly locked into place; check visually and by pulling the connector.



4. Connect the fuel pump 5P (Black) connector.



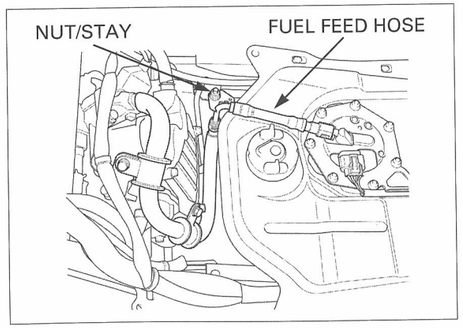
5. Install the fuel feed hose to the stay and tighten the nut securely.
6. Temporally connect the positive cable and negative cable to the battery.

Do not start the engine.

7. Turn the ignition switch "ON".

   The fuel pump will run for about 2 seconds, and fuel pressure will rise.
   Repeat 2 or 3 times, and check that there is no leakage in the fuel supply system.

   Install the floor step (page 3-7).



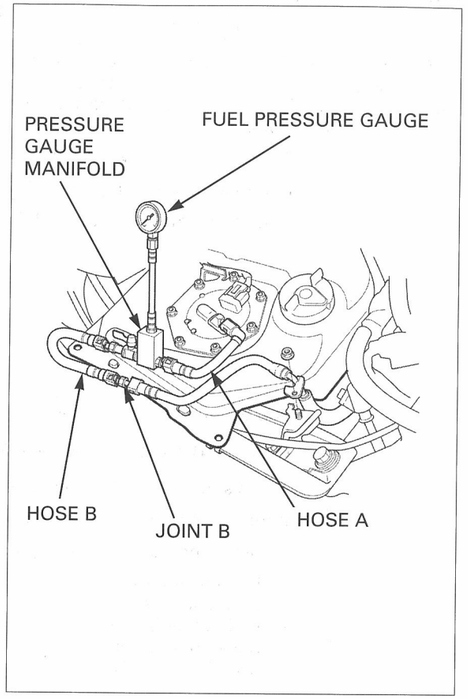
FUEL PRESSURE TEST

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).

Attach the fuel pressure gauge set and pressure gauge.

TOOLS:

Fuel pressure gauge	**07406-0040004**
Pressure gauge manifold	**07ZAJ-S5A0111**
Fuel attachment hose A	**07ZAJ-S5A0120**
Fuel attachment hose B	**07ZAJ-S5A0130**
Fuel attachment joint B	**07ZAJ-S5A0150**



Temporally connect the positive cable and negative cable to the battery.

Start the engine and let it idle.

Read the fuel pressure.

IDLE SPEED: 2,000 ± 100 min^{-1} (rpm)
FUEL PRESSURE: 294 kPa (3.0 kgf/cm^2, 43 psi)

If the fuel pressure is higher than specified, replace the fuel pump assembly.

If the fuel pressure is lower than specified, inspect the following:

- Fuel line leaking
- Fuel pump (page 6-50)
- Clogged fuel filter (Assembly of the fuel pump)

After inspection, remove the fuel pressure gauge and pressure gauge set from the fuel pump.

Connect the quick connect fitting (page 6-47).

FUEL FLOW INSPECTION

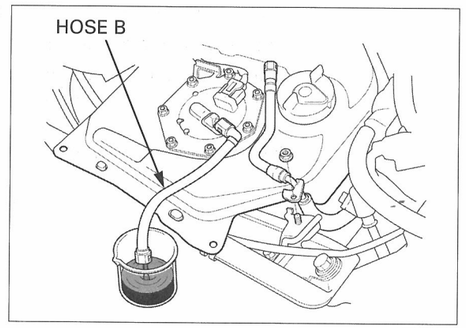
Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).

Turn the ignition switch "OFF".

Connect the special tool to the fuel pump joint.

TOOL:

Fuel attachment hose B	**07ZAJ-S5A0130**



Wipe off spilled out gasoline.

Place the end of the hose into an approved gasoline container.

Measure the amount of fuel flow with the ignition switch turning "ON".

NOTE:

The fuel pump operates for two seconds. Repeat 5 times so that the total measuring time.

Amount of fuel flow:
42 cm^3 (1.4 US oz, 1.5 Imp oz) minimum /10 seconds at 12 V

If the fuel flow is less than specified, inspect the following:

- Fuel pump (page 6-50).
- Clogged fuel filter (Assembly of the fuel pump)

Connect the quick connect fitting (page 6-47).

FUEL PUMP

INSPECTION

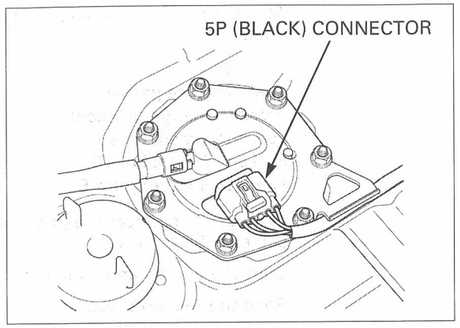
Refer to the fuel reserve sensor inspection (page 19-10).

Turn the ignition switch "ON" and confirm that the fuel pump operates for a few seconds.
If the fuel pump does not operate, inspect as follows:

Turn the ignition switch "OFF".

Remove the floor step (page 3-7).

Disconnect the fuel pump 5P (Black) connector.



Turn the ignition switch "ON" and measure the voltage between the terminals.

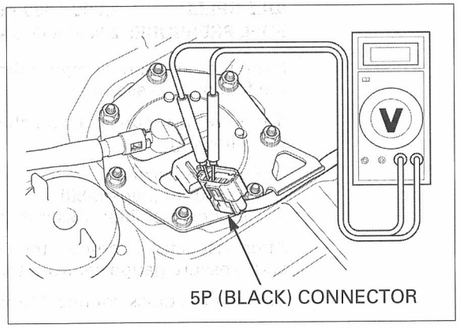
CONNECTION: Red/Black (+) – Green (–)

There should be battery voltage for a few seconds.

If there is battery voltage, replace the fuel pump.

If there is no battery voltage, inspect the following:

- Main fuse 20 A
- Sub fuse 15 A
- Main relay (page 6-66)
- Bank angle sensor (page 6-65)
- ECM (page 6-67)



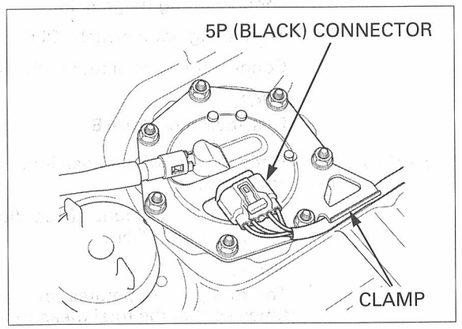
REMOVAL

- It is impossible to disassemble the fuel pump after removing it.

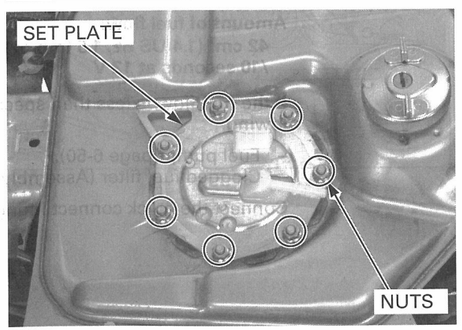
Clean around the fuel pump.

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).

Disconnect the fuel pump 5P (Black) connector.
Remove the fuel pump wire from the clamp.

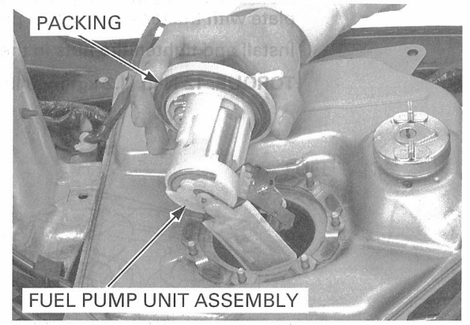


Remove the nuts and set plate.



Be careful not to damage the fuel level sensor.

Remove the fuel pump unit assembly and packing.

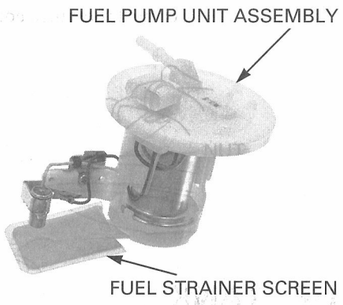


INSPECTION

Check the fuel pump unit for wear or damage.

Check the fuel strainer screen for wear or damage.

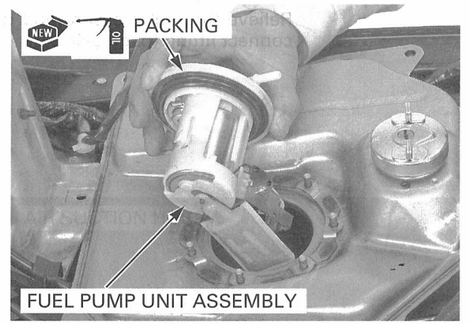
Replace the fuel pump unit if necessary.



INSTALLATION

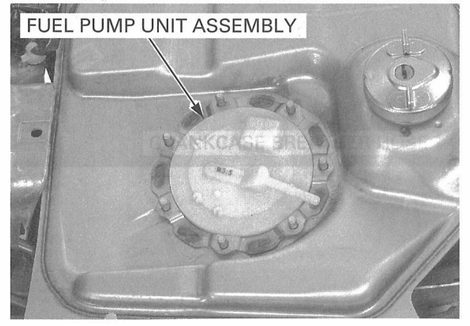
Always replace the packing when the fuel tank is removed.
Be careful not to pinch the dirt and debris between the fuel pump and packing.

Install the new packing to the fuel tank.
Apply engine oil to the inside of the packing.



Be careful not to damage the fuel level sensor.

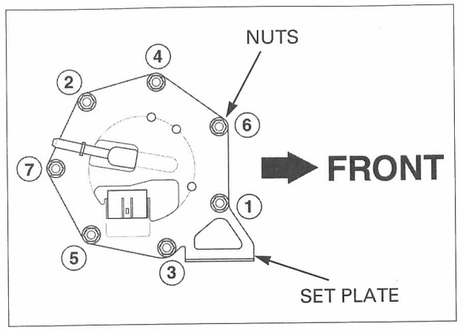
Install the fuel pump unit to the fuel tank.



Install the set plate aligning the holes on the set plate with the tabs on the fuel pump unit.

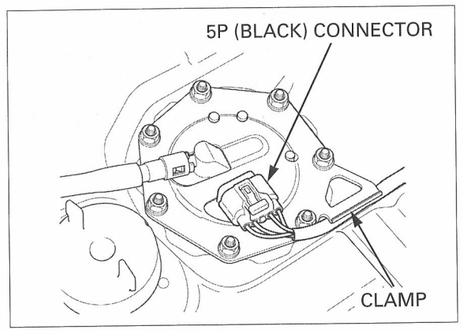
Install and tighten the nuts in the sequence shown.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



Connect the fuel pump 5P (Black) connector.
Install the fuel pump wire to the clamp.

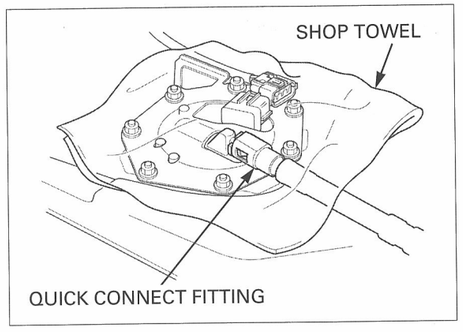
Connect the quick connect fitting (page 6-47).



FUEL TANK

REMOVAL

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).

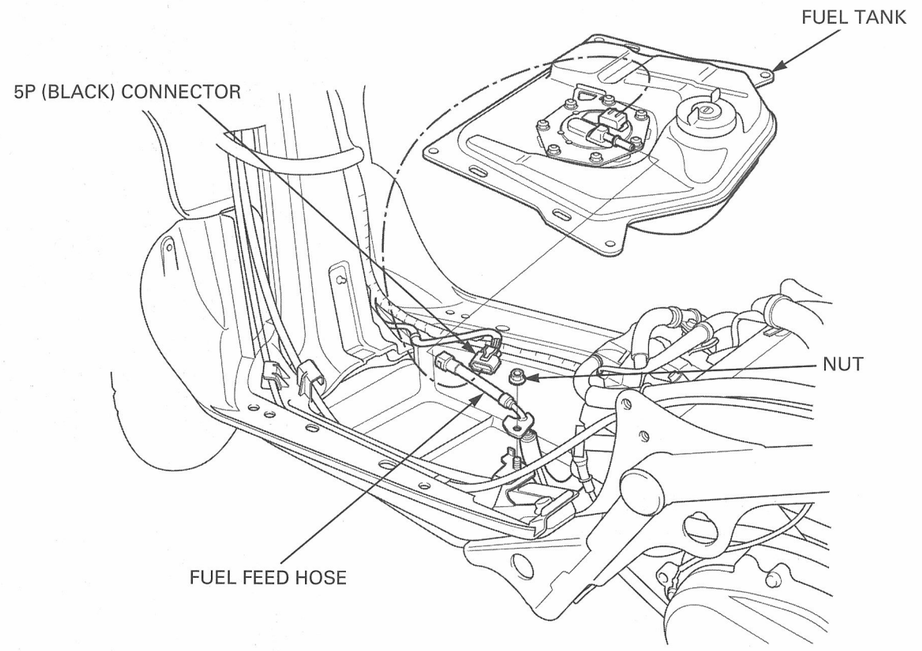


Remove the holes on the fuel tank from the tabs on the frame, then remove the fuel tank.

INSTALLATION

Installation is in the reverse order of removal.

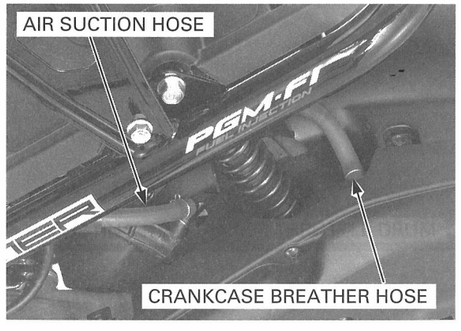
Connect the quick connect fitting (page 6-47).



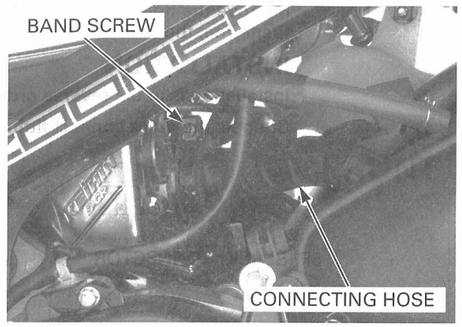
AIR CLEANER HOUSING

REMOVAL

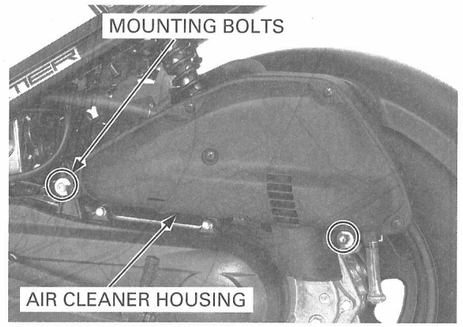
Disconnect the crankcase breather hose and air suction hose from the air cleaner housing.



Loosen the connecting hose band screw and remove the connecting hose from the throttle body.

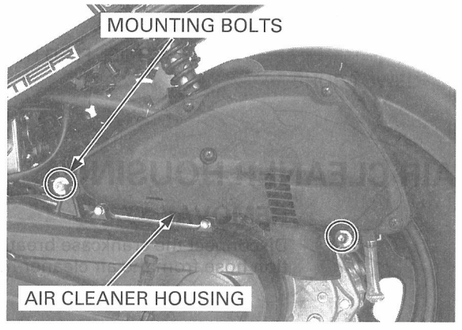


Remove the bolts and air cleaner housing.



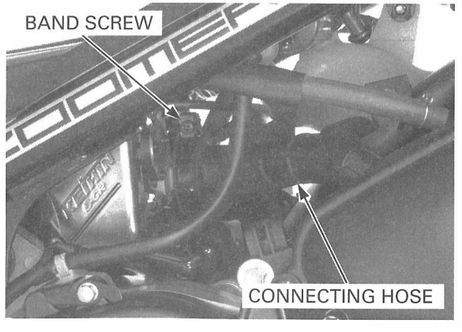
INSTALLATION

Install the air cleaner housing and tighten the bolts securely.

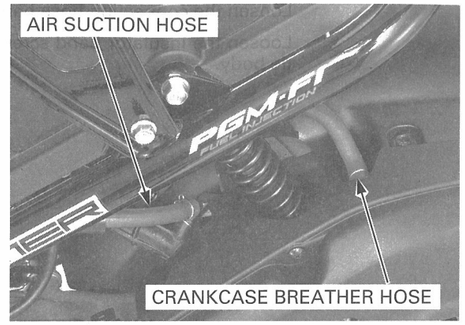


Install the connecting hose to the throttle body.

Tighten the connecting hose band screw securely.



Connect the crankcase breather hose and air suction hose to the air cleaner housing.



THROTTLE BODY

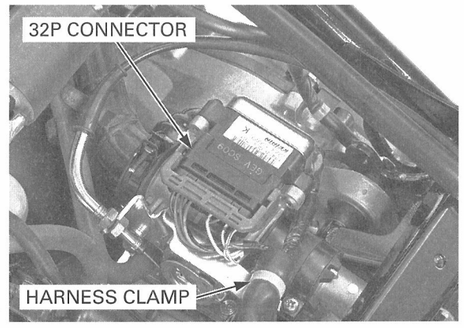
REMOVAL

NOTICE

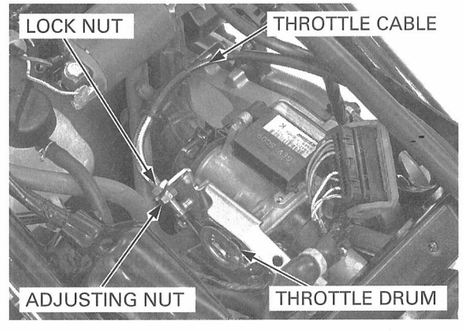
Before disconnecting fuel feed hose, relieve pressure from the system by disconnecting the quick connect fitting in the fuel pump (page 6-46).

Disconnect the throttle body 32P connector.

Remove the harness clamp from the throttle body.

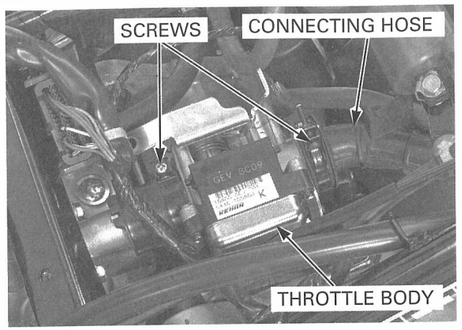


Loosen the throttle cable lock nut and adjusting nut then disconnect the throttle cable from the throttle drum and cable bracket.

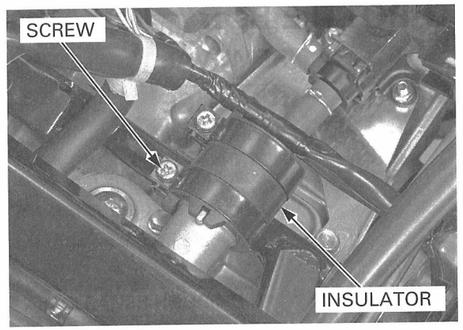


Loosen the connecting hose band screw.

Loosen the insulator band screw and remove throttle body.



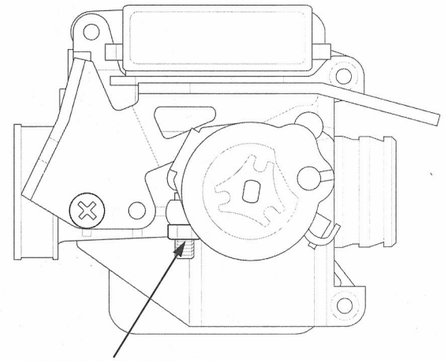
Loosen the insulator band screw and remove insulator from the intake pipe.



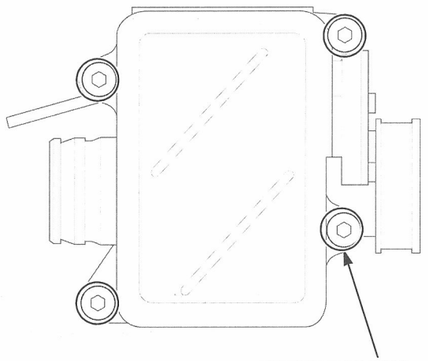
NOTICE

- *The throttle body is factory pre-set. Do not disassemble in a way other than shown in this manual.*
- *Do not snap the throttle valve from full open to full close after the throttle cable has been removed. It may cause incorrect idle operation.*
- *Do not damage the throttle body. It may cause incorrect throttle valve.*
- *Do not loosen or tighten the white painted bolts, nuts and screws of the throttle body. Loosening or tightening them can cause throttle body malfunction.*

RIGHT SIDE VIEW:



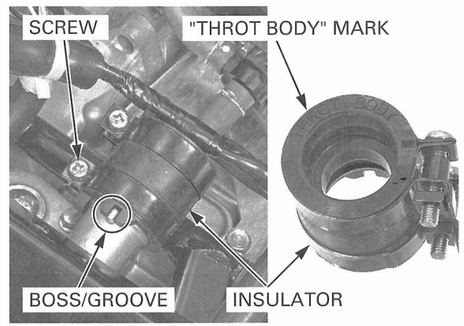
LEFT SIDE VIEW:



INSTALLATION

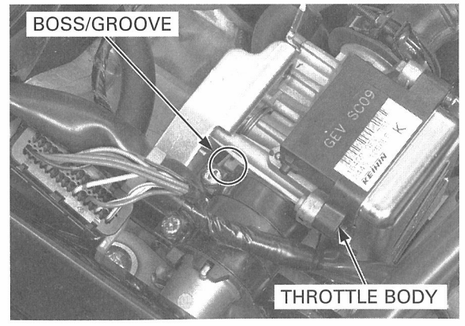
Be careful not to damage the insulator.

Install the insulator to the intake pipe by aligning the boss of the intake pipe and groove of the insulator with its "THROT. BODY." mark facing the throttle body.



Be careful not to damage the insulator and connecting hose.

Install the throttle body into the insulator by aligning the boss of the throttle body and groove of the insulator.

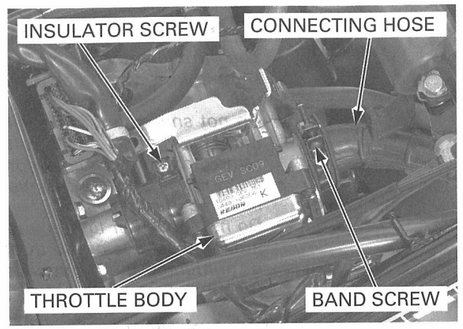


Install and tighten the insulator band screw to specified torque.

TORQUE: 2.9 N·m (0.3 kgf·m, 2.1 lbf·ft)

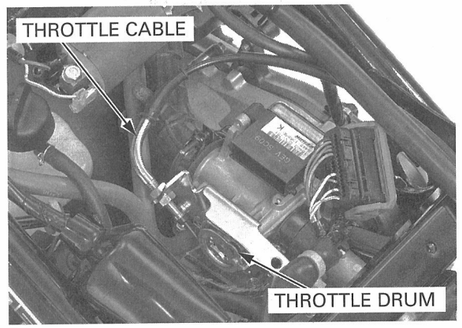
Install the connecting hose into the throttle body.

Tighten the band screw securely.



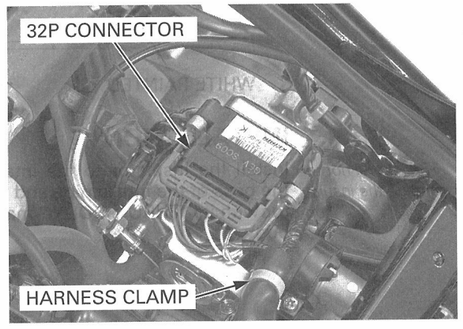
Connect the throttle cable to the throttle drum and cable bracket.

Adjust the throttle grip free play (page 4-4).



Connect the throttle body 32P connector.

Install the harness clamp to the throttle body.



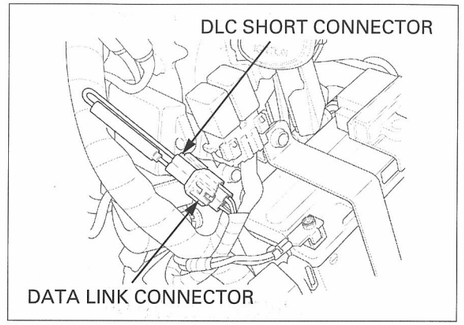
THROTTLE VALVE FULLY CLOSED POSITION RESET PROCEDURE

- If the throttle body is replaced, reset the throttle valve fully closed position as following.

Remove the floor step (page 3-7).

1. Reset the self-diagnosis memory (page 6-10).
2. Turn the ignition switch "OFF".
3. Connect the special tool to the Data Link Connector (DLC).

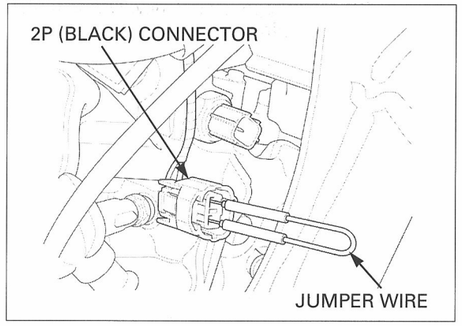
   TOOL:
   DLC short connector **070PZ-ZY30100**



4. Disconnect the ECT sensor 2P (Black) connector.

   Short the ECT sensor 2P (Black) connector terminals of the wire harness side using the jumper wire.

   CONNECTION: Pink – Green/Blue

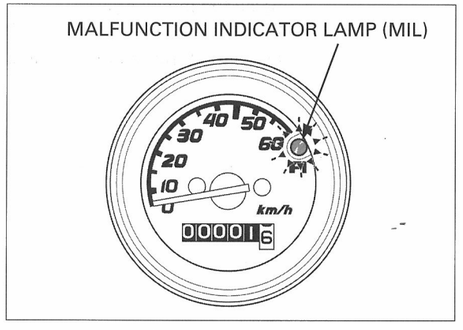


5. Turn the ignition switch "ON".

   Disconnect the jumper wire while the MIL blinking (10 seconds).

   If the MIL begins short blink (0.3 seconds), the throttle valve fully closed position is reset.

   If the MIL stays lit, the throttle valve fully closed position is not reset, repeat the reset procedure from the step 1.



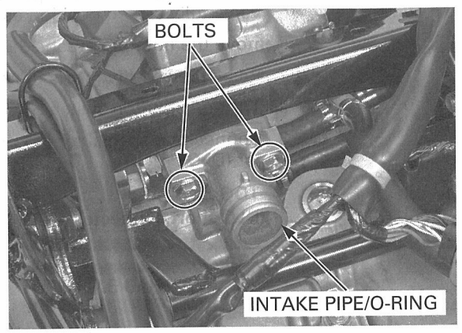
INTAKE PIPE

REMOVAL

Remove the throttle body (page 6-55).

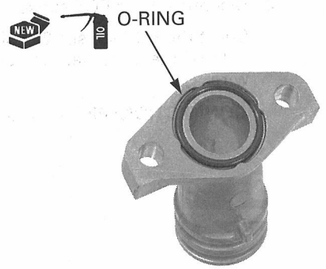
Remove the followings:

- Bolts
- Intake pipe
- O-ring



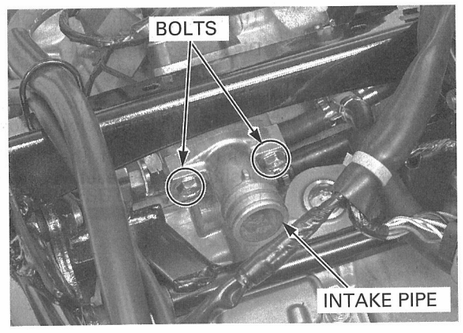
INSTALLATION

Apply oil to a new O-ring to the groove on the intake pipe.



Install the intake pipe.
Install and tighten the bolts securely.

Install the throttle body (page 6-57).



INJECTOR

REMOVAL

NOTICE

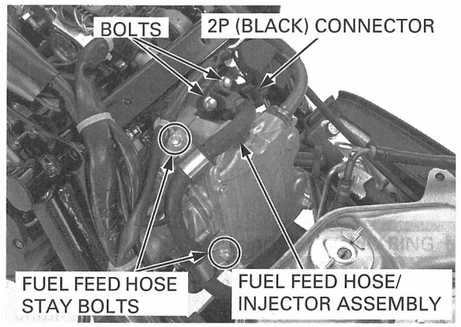
Before disconnecting fuel feed hose, relieve pressure from the system by disconnecting the quick connect fitting in the fuel pump (page 6-46).

Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).

Clean around the injector with compressed air before removing, and be sure that no debris is allowed to enter the engine.

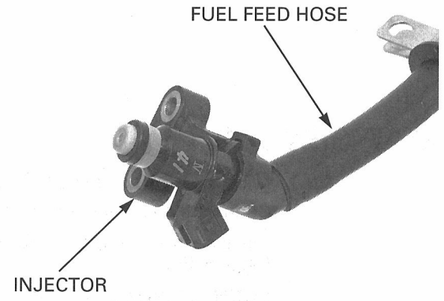
Disconnect the injector 2P (Black) connector.

Remove the bolts and the fuel feed hose/injector assembly.



Remove the injector from the fuel feed hose.

Remove the O-ring and seal ring from the injector.

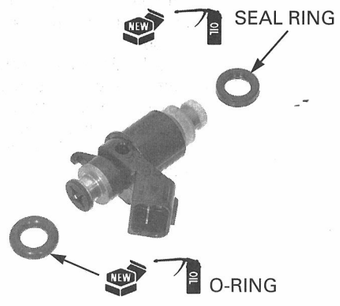


INSTALLATION

Coat a new O-ring and seal ring with engine oil.

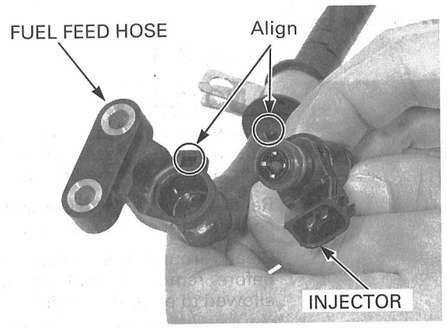
Replace the O-ring and seal ring with new ones as a set.

Install a new O-ring and seal ring, being careful not to damage them.



Align the boss of the injector and groove of the fuel feed hose.

Install the injector into the fuel feed hose, being careful not to damage the O-ring.

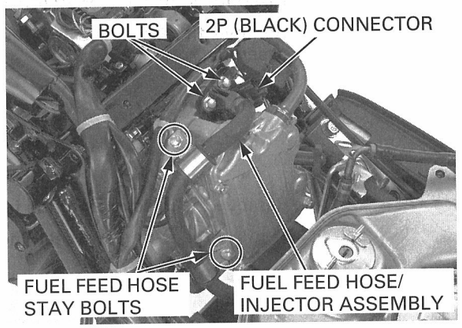


Install the fuel feed hose/injector assembly to the cylinder head, being careful not to damage the seal ring.
Install and tighten the bolts to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Connect the injector 2P (Black) connector.

Install the quick connect fitting (page 6-47).



MAP SENSOR

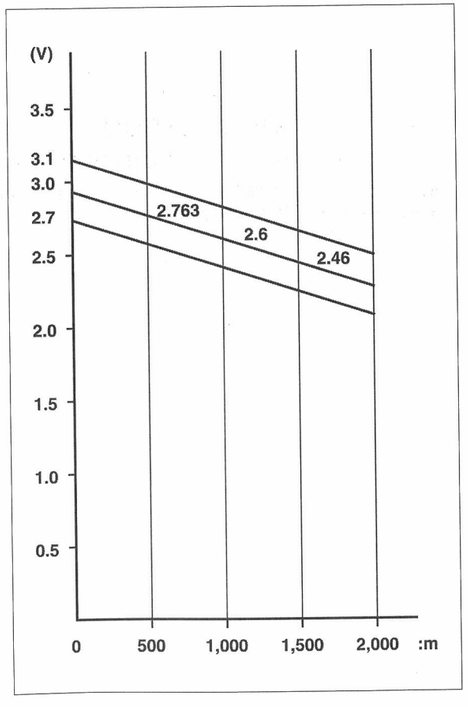
OUTPUT VOLTAGE INSPECTION

Connect the test harness to the ECM (page 6-10).

Measure the voltage at the test harness terminals (page 6-15).

CONNECTION: B11 (+) – B15 (–)
STANDARD: 2.7– 3.1 V

The MAP sensor output voltage (above) is measured under the standard atmosphere (1 atm = 1,030 hPa).
The MAP sensor output voltage is affected by the distance above sea level, because the output voltage is changed by atmosphere.
Check the sea level measurement and be sure that the measured voltage falls within the specified value.



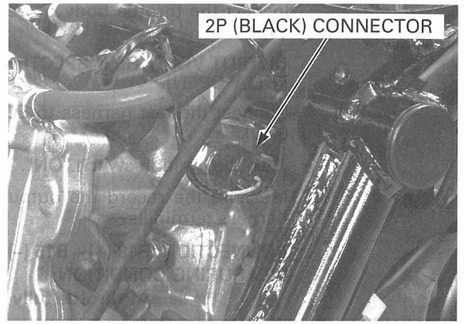
ECT SENSOR

REMOVAL/INSTALLATION

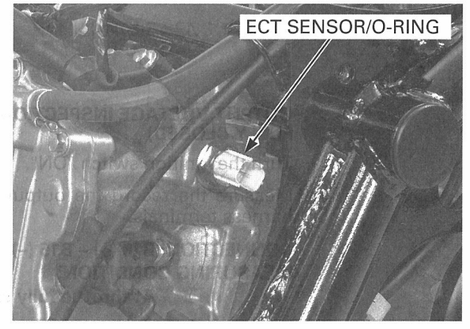
Remove the floor step (page 3-7).
Drain the coolant (page 7-7).

Replace the ECT sensor while the engine is cold.

Disconnect the ECT sensor 2P (Black) connector from the sensor.



Remove the ECT sensor and O-ring.



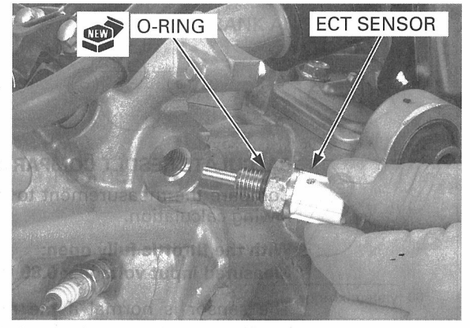
Install a new O-ring and ECT sensor.
Tighten the ECT sensor to the specified torque.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the ECT sensor 2P (Black) connector.

Install the floor step (page 3-7).

Fill the cooling system with recommended coolant (page 7-6).



TP SENSOR

INSPECTION

Inspect the throttle body power input line (page 6-14).

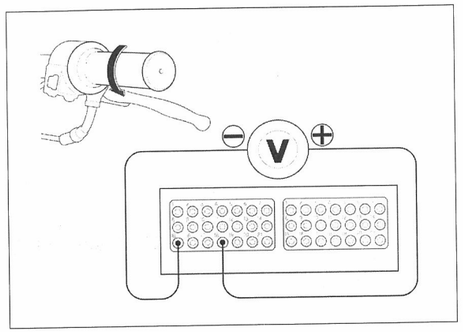
OUTPUT VOLTAGE INSPECTION (WITH THROTTLE FULLY OPEN)

Connect the test harness to ECM connectors (page 6-10).

Turn the ignition switch "ON".

Measure the record the output voltage at the test harness terminals.

CONNECTION: B18 (+) – B15 (–)
MEASURING CONDITION:
At throttle fully open

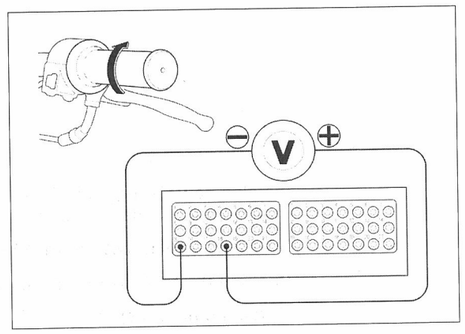


OUTPUT VOLTAGE INSPECTION (WITH THROTTLE FULLY CLOSED)

Turn the ignition switch "ON".

Measure the record the output voltage at the test harness terminals.

CONNECTION: B18 (+) – B15 (–)
MEASURING CONDITION:
At throttle fully close



CALCULATE RESULT COMPARISON

Compare the measurement to the result of the following calculation.

With the throttle fully open:
Measured input voltage x 0.89 V = Vo

The sensor is normal if the measurement output voltage measured in step 1 is within 8% of Vo.

With the throttle fully closed:
Measured input voltage x 0.1 V = Vc

The sensor is normal if the throttle closed output voltage measured in step 2 is within 8% of Vc.

Using an analog meter, check that the needle of the volt meter swings slowly when the throttle is opened gradually.

BANK ANGLE SENSOR

INSPECTION

Turn the ignition switch "OFF".

Remove the inner cover (page 3-5).

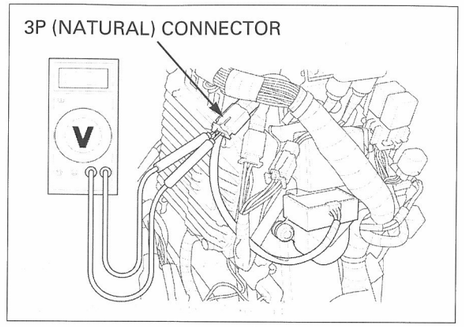
Support the motorcycle securely on its center stand.

Turn the ignition switch "ON".

Do not disconnect the bank angle sensor 3P (Natural connector.

Measure the voltage at the bank angle sensor 3P (Natural) connector terminals with its connected.

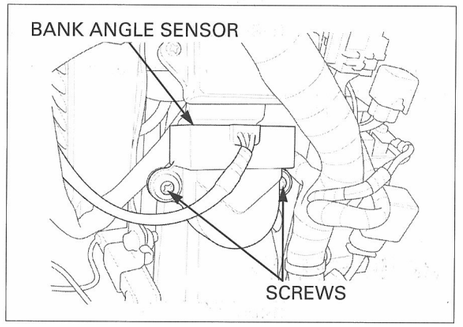
CONNECTION	STANDARD
Red/Green – Blue/Green	Battery voltage
Red/Orange – Blue/Green	0 – 0.9 V



Turn the ignition switch "OFF".

Do not disconnect the bank angle sensor 3P (Natural connector.

Remove the screws and bank angle sensor.



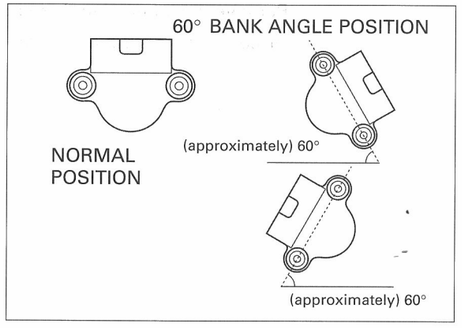
If you check this test, the ignition switch "OFF", then turn the ignition switch "ON".

Place the bank angle sensor is normal position as shown, and ignition switch "ON" then measure the voltage at the bank angle sensor 3P (Natural) connector.

CONNECTION: Red/Orange (+) – Blue/Green (–)
STANDARD: No voltage

Incline the bank angle sensor approximately 60° to the left or right with keep the ignition switch "ON" then measure the voltage at the bank angle sensor 3P (Natural) connector.

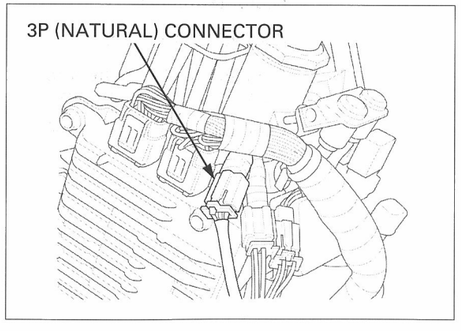
CONNECTION: Red/Orange (+) – Blue/Green (–)
STANDARD: 4 V or more



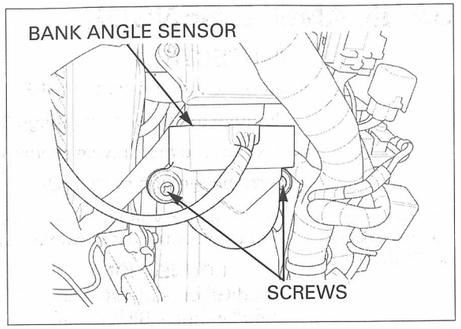
REMOVAL/INSTALLATION

Remove the inner cover (page 3-5).

Disconnect the bank angle sensor 3P (Natural) connector.



Remove the two screws and bank angle sensor.

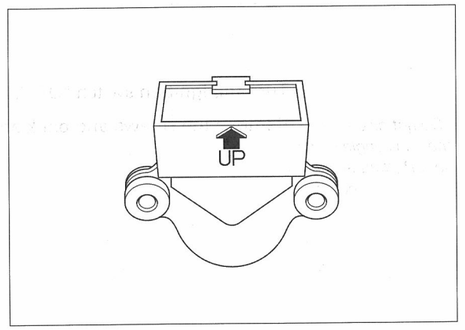


Install the bank angle sensor with its "UP" mark facing up.
Tighten the mounting screws to the specified torque.

TORQUE: 1.2 N·m (0.12 kgf·m, 0.9 lbf·ft)

Route the sensor wire correctly (page 1-15).

Connect the bank angle sensor 3P (Natural) connector.

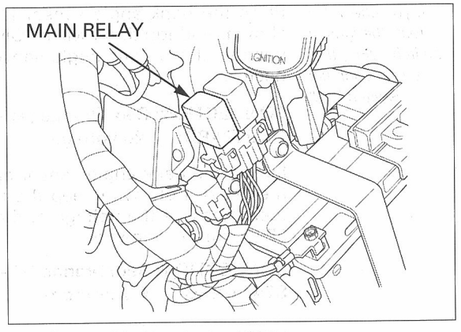


MAIN RELAY

INSPECTION

Remove the inner cover (page 3-5).

Disconnect the main relay from the relay connector.

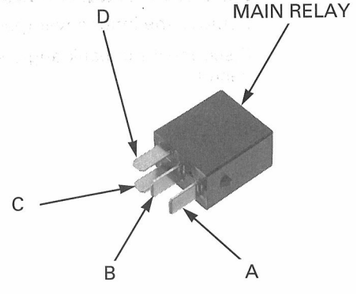


Connect the ohmmeter to the fuel pump relay connector terminals.

CONNECTION: A – B

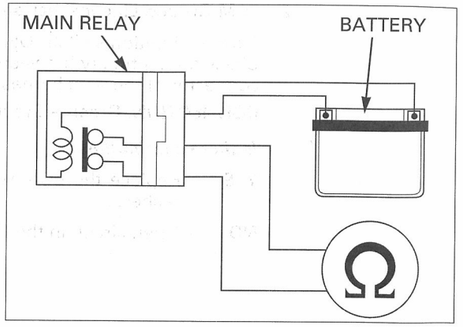
Connect the 12V battery to the following fuel pump relay connector terminals.

CONNECTION: C (+) – D (–)



There should be continuity only when the 12V battery is connected.

If there is no continuity when the 12V battery is connected, replace the fuel pump relay.

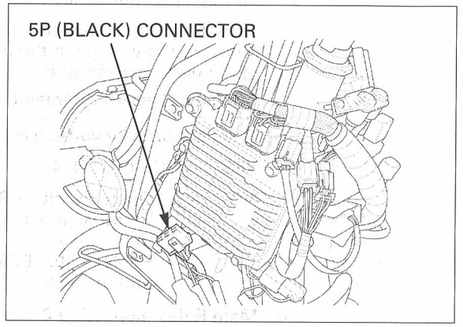


ECM (ENGINE CONTROL MODULE)

ECM POWER/GROUND LINE INSPECTION

Remove the inner cover (page 3-5).

Turn the ignition switch "OFF".
Disconnect the ECM 5P (Black) connector.
Check for loose or poor contact on the ECM 5P (Black) connector.



Engine does not start (MIL no blinks)

1. **ECM Power Input Voltage Inspection**

   Disconnect the ECM 5P (Black) connector.

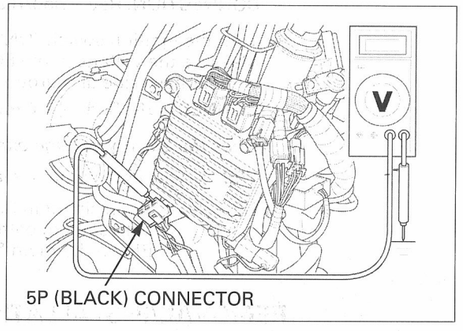
   Turn the ignition switch "ON".
   Measure the voltage between the ECM 5P (Black) connector of the wire harness side and ground.

   CONNECTION: Red (+) – Ground (–)

   Does the battery voltage exit?

   YES – GO TO STEP 2.

   NO – GO TO STEP 3.



2. **ECM Ground Line Inspection**

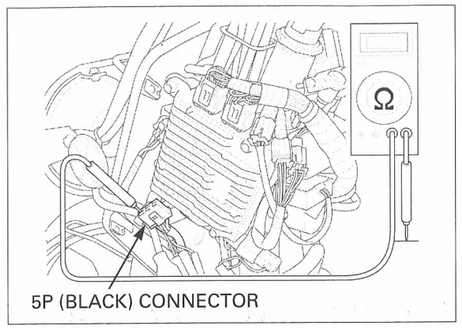
Turn the ignition switch "OFF".
Check for continuity between the ECM 5P (Black) connector of the wire harness side and ground.

CONNECTION: Green – Ground

Is there continuities?

YES – Replace the ECM with a new one, and recheck.

NO – Open circuit in the Green wire.



3. **Main Relay Inspection 1**

Turn the ignition switch "OFF".
Remove the main relay (page 6-66).

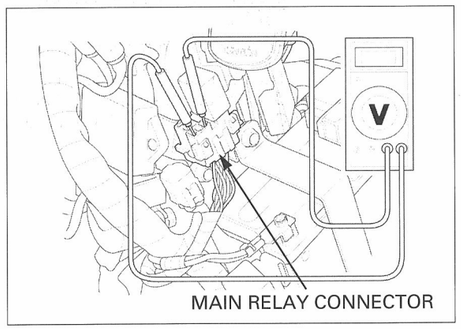
Turn the ignition switch "ON".
Measure the voltage at the main relay connector of the wire harness side.

CONNECTION: Red/Green (+) – Green/White (–)

Does the battery voltage exit?

YES – GO TO STEP 4.

NO – • Open circuit in Red/Green or Green/White wire between the ECM and the main relay.
• Replace the ECM with a new one, and recheck.



4. **Main Relay Inspection 2**

Turn the ignition switch "OFF".
Jump the main relay connector terminals.

CONNECTION: Red – Red/Black

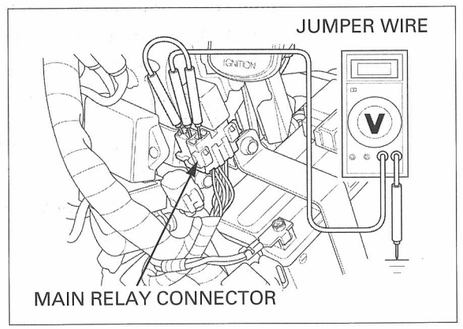
Turn the ignition switch "ON".
Measure the voltage at the ECM connector of the wire harness side and ground.

CONNECTION: Red (+) – Ground (–)

Does the battery voltage exit?

YES – Inspect the main relay (page 6-66).

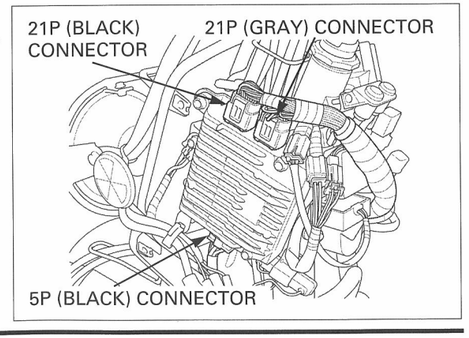
NO – • Open circuit in Red or Red/Black wire between the battery and the ECM.
• Blown the main fuse (20 A).



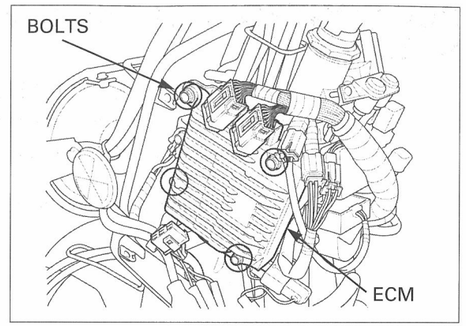
REMOVAL/INSTALLATION

Remove the inner cover (page 3-8).

Disconnect the ECM 22P (Black), 22P (Gray) and 5P (Black) connectors.



Remove the bolts and the ECM.



ENGINE IDLE SPEED

NOTE:
- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- The engine must be warm for accurate idle speed inspection and adjustment.
- This system eliminates the need for manual idle speed adjustment from the previous designs.
- Make sure the malfunction indicator lamp (MIL) does not indicate any failure codes before inspecting the engine idle speed.

Support the scooter with its center stand on a level surface.
Warm up the engine to normal operating temperature.

Remove the plug maintenance lid and connect a tachometer.

Check the idle speed.

IDLE SPEED: 2,000 ± 100 min^{-1} (rpm)

If the engine hard to start or engine idle speed is out of specification, check that the MIL blinks (page 6-8).

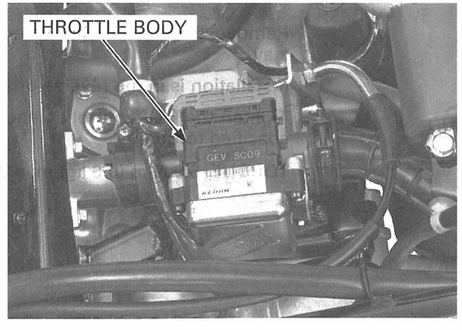
IAC VALVE

INSPECTION

- If the engine hard to start or engine idle speed is out of specification, check that the MIL blinks (page 6-8).

Turn the ignition switch "OFF".

Check the IAC valve (step motor) operating sound immediately after the ignition switch turning "ON".



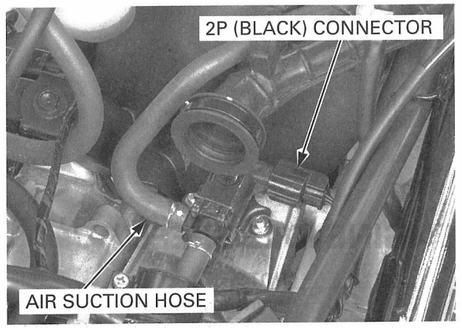
PCV CONTROL SOLENOID VALVE/ REED VALVE

REMOVAL/INSTALLATION

Remove the throttle body (page 6-55).

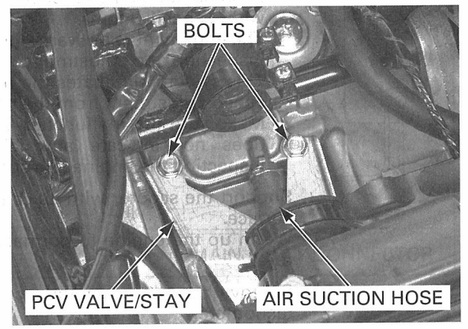
Disconnect the PCV control solenoid valve 2P (Black) connector.

Disconnect the air suction hose.

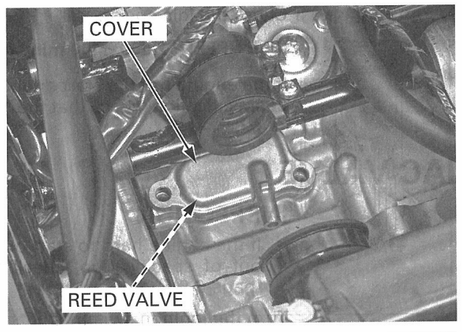


Disconnect the air suction hose.

Remove the bolts and the PCV control solenoid valve/stay.



Remove the reed valve cover and reed valve.

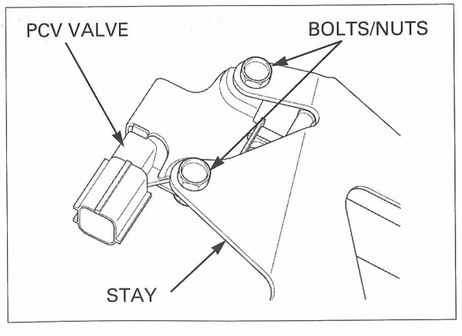


Remove the nuts, bolts, solenoid valve from the stay.

Installation is in the reverse order of removal.

Tighten the PCV control solenoid valve bolts to the specified torque.

TORQUE: 5.9 N·m (0.6 kgf·m, 4.3 lbf·ft)

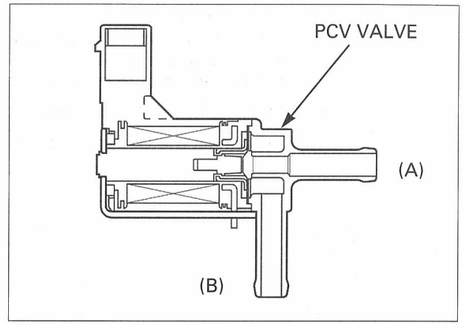


INSPECTION

Remove the PCV control solenoid valve and reed valve (page 6-70).

PCV CONTROL SOLENOID VALVE

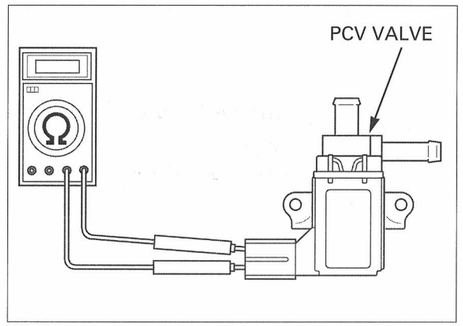
Check that the air should flow (A) to (B), only when the 12 V battery is connected to the PCV control solenoid valve terminals.



Check the resistance between the terminals of the PCV control solenoid valve.

STANDARD: 30 – 34 Ω (20° C/68° F)

If the resistance is out of specification, replace the PCV control valve.



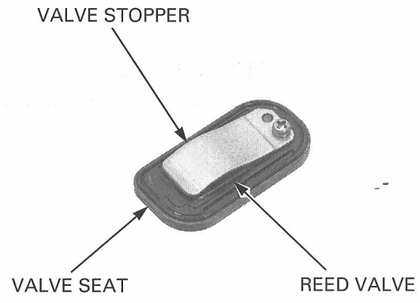
REED VALVE

Check the followings:

- Reed valve for wear or damage
- Valve seat for wear or damage
- Valve stopper for damage

Check the no clearance between the reed valve and valve seat.

Replace the reed valve as an assembly, if necessary.



O_2 SENSOR

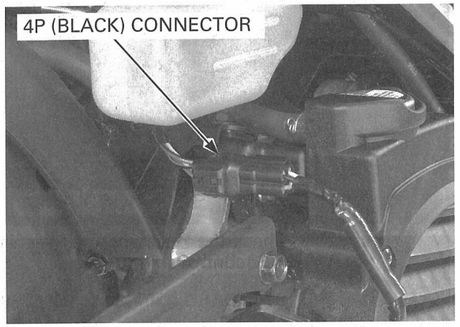
REMOVAL

- Handle the O_2 sensor with care.
- Do not get grease, oil or other materials in the O_2 sensor air hole.
- Do not use an impact wrench while removing or installing the O_2 sensor.
- Be careful not to damage the sensor wire.

Do not service the O_2 sensor while it is hot.

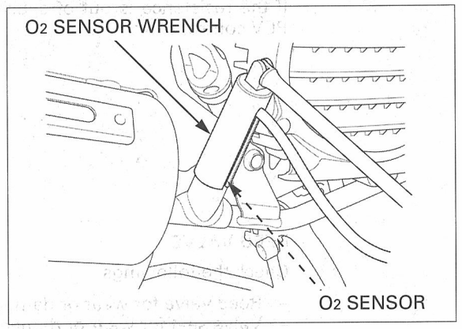
Remove the muffler protector (page 3-10).

Disconnect the O_2 sensor 4P (Black) connector.



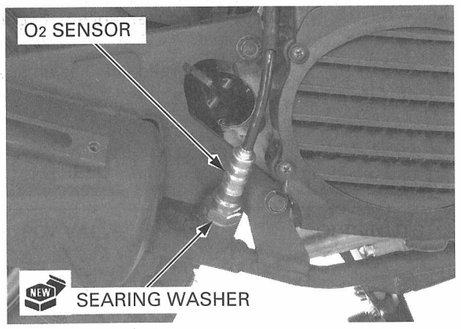
Remove the O_2 sensor using the special tool.

TOOL:
O_2 sensor wrench **07LAA-PT50101**



INSTALLATION

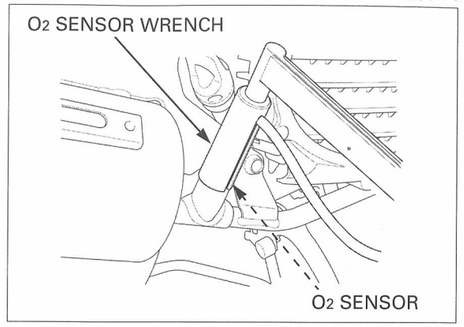
Install the new sealing washer to the O_2 sensor.



Tighten the O_2 sensor to the specified torque.

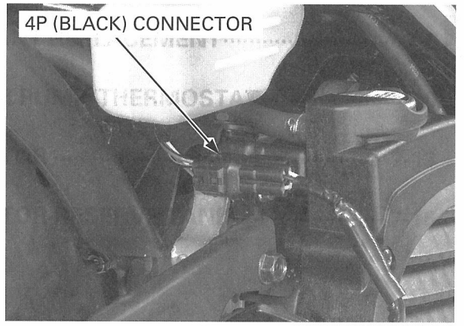
TOOL:
O_2 sensor wrench **07LAA-PT50101**

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Connect the O_2 sensor 4P (Black) connector.

Install the muffler protector (page 3-10).

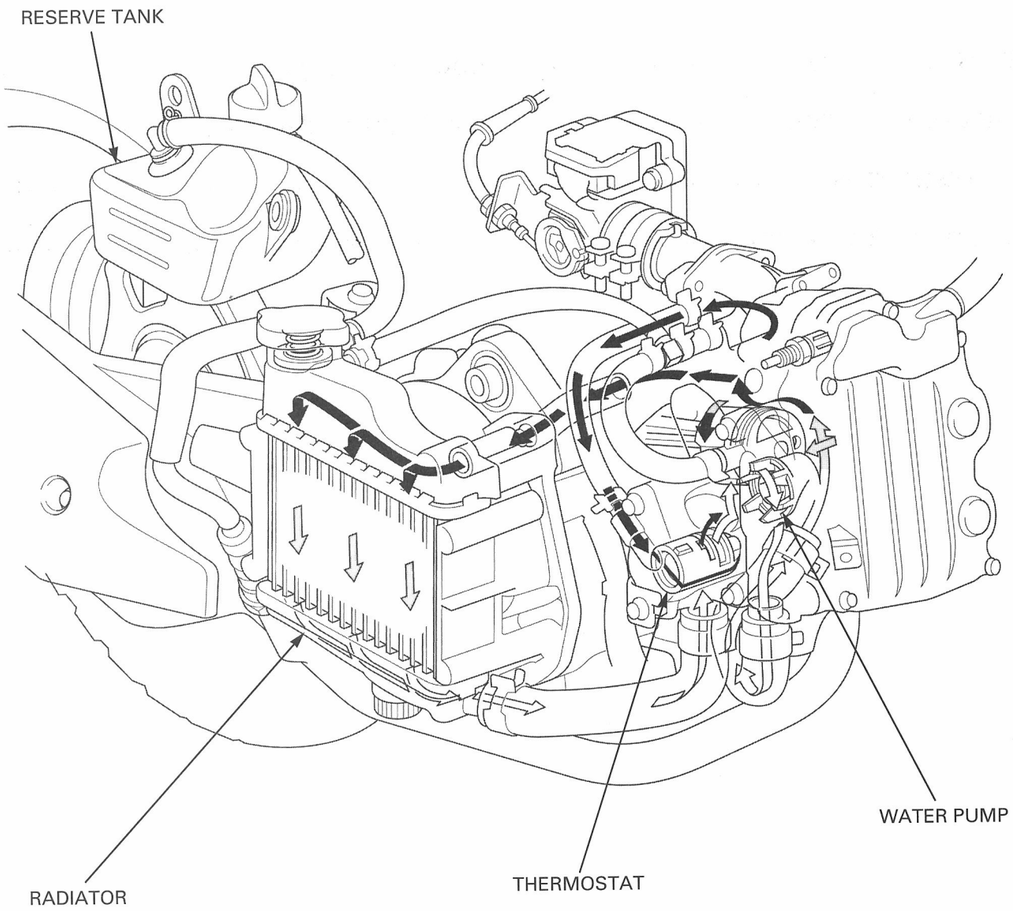


MEMO

7. COOLING SYSTEM

SYSTEM FLOW PATTERN 7-2
SERVICE INFORMATION 7-3
TROUBLESHOOTING 7-4
COOLANT SYSTEM TESTING 7-5
COOLANT REPLACEMENT 7-6
WATER PUMP/THERMOSTAT 7-8
RADIATOR 7-13
RADIATOR RESERVE TANK 7-16

SYSTEM FLOW PATTERN



SERVICE INFORMATION

GENERAL

⚠ WARNING

Removing the radiator cap while the engine is hot can allow the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator cap.

NOTICE

Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

- Add coolant at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- All cooling system services can be done with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- When the coolant temperature exceeds 120 °C (248 °F), the coolant temperature indicator will turn on. The ECM will then control the ignition and reduce engine speed below 5,000 min^{-1} (rpm). At this time, check the cooling system and engine for leaks or damage. If everything is OK, then check the coolant indicator circuit and ECT sensor (page 19-13).
- This scooter features a magnetic-coupling water pump.

SPECIFICATIONS

ITEM		STANDARD
Coolant capacity	Radiator and engine	0.28 liter (0.30 US qt, 0.25 Imp qt)
	Reserve tank	0.24 liter (0.25 US qt, 0.21 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 16 – 20 psi)
Thermostat	Begin to open	74 – 78 °C (165 – 172 °F)
	Fully open	100 °C (212 °F)
	Valve lift	3.5 mm (0.1 in) minimum
Recommended antifreeze		High quality ethylene glycol antifreeze containing corrosion protection inhibitors
Standard coolant concentration		1:1 mixture with soft water

TORQUE VALUES

Coolant drain bolt	0.9 N·m (0.1 kgf·m, 0.7 lbf·ft)
Radiator cover screw	0.9 N·m (0.1 kgf·m, 0.7 lbf·ft)
Fuel feed hose stay bolt	10 N·m (1.0 kgf·m, 7 lbf·ft)

TROUBLESHOOTING

Engine temperature too high
- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant
- Passage blocked in radiator, hoses or water jacket
- Air in system
- Faulty water pump
- Faulty ECT sensor

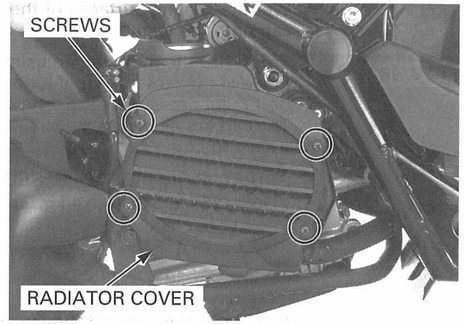
Engine temperature too low
- Faulty ECT sensor
- Thermostat stuck open

Coolant leak
- Deteriorated O-rings
- Faulty radiator cap
- Damaged or deteriorated cylinder head gasket
- Loose hose connection or clamp
- Damaged or deteriorated hoses

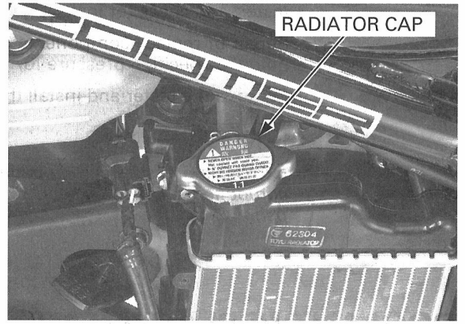
COOLANT SYSTEM TESTING

COOLANT (HYDROMETER TEST)

Remove the four screws and radiator cover.



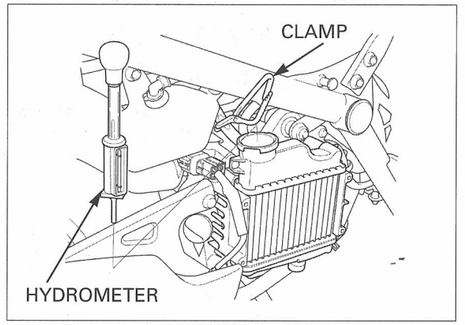
Remove the radiator cap.



Pinch the siphon hose with a hose clamp.

Test the coolant gravity using a hydrometer (see below for "Coolant specific gravity chart").
For maximum corrosion protection, a 1:1 solution of ethylene glycol and distilled water is recommended (page 7-6).
Look for contamination and replace the coolant if necessary.

Install the removed parts in the reverse order of removal.



COOLANT SPECIFIC GRAVITY CHART

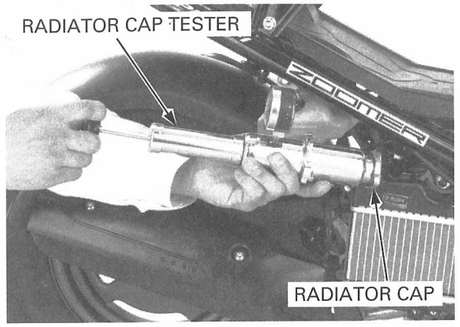
		Coolant temperature °C (°F)										
		0 (32)	5 (41)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Coolant ratio%	5	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.999	0.997
	10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
	15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
	20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
	25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
	30	1.053	1.052	1.051	1.047	1.046	1.045	1.043	1.041	1.038	1.035	1.032
	35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
	40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
	45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
	50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
	55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
	60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071

RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap.
Wet the sealing surfaces of the cap, then install the cap onto the tester.

Pressurize the radiator cap using the tester.
Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low.
The cap must hold the specified pressure for at least 6 seconds.

RADIATOR CAP RELIEF PRESSURE:
108 – 137 kPa (1.1 – 1.4 kgf/cm², 16 – 20 psi)



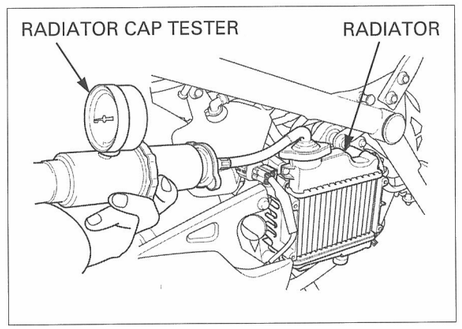
Pressurize the radiator, engine and hoses using the tester, and check for leaks.

Repair or replace components if the system will not hold the specified pressure for at least 6 seconds.

Remove the tester and install the radiator cap.

NOTICE

Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm², 20 psi).



COOLANT REPLACEMENT

PREPARATION

NOTICE

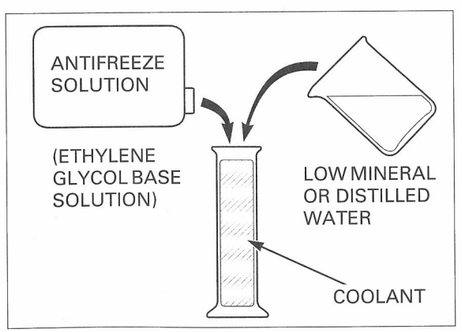
Using coolant with silicate corrosion inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

NOTE:
- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage. Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.

Mix only distilled, low mineral water with the recommended antifreeze.

RECOMMENDED ANTIFREEZE:
High quality ethylene glycol antifreeze containing corrosion protection inhibitors

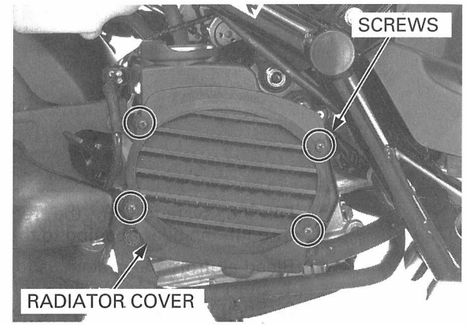
RECOMMENDED MIXTURE:
1:1 (distilled water and recommended antifreeze)



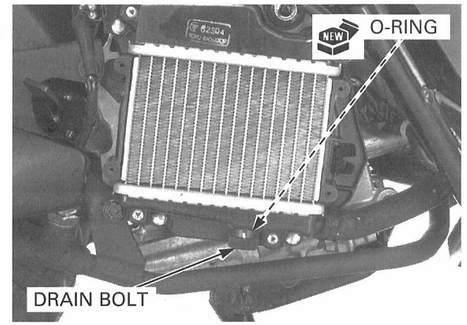
REPLACEMENT/AIR BLEEDING

NOTE:
- When filling the system or reserve tank with coolant, or checking the coolant level, place the scooter on its center stand on a flat, level surface.

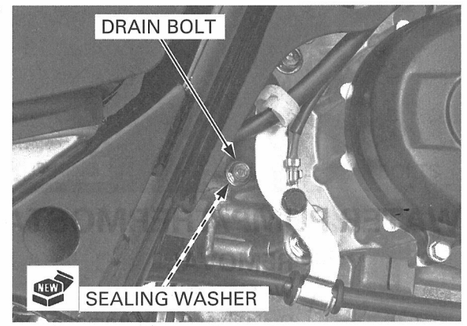
Remove the four screws and radiator cover.



Remove the radiator cap.
Drain the coolant from the system by removing the drain bolt and O-ring.



Remove the cylinder drain bolt with sealing washer and drain the coolant from the cylinder.

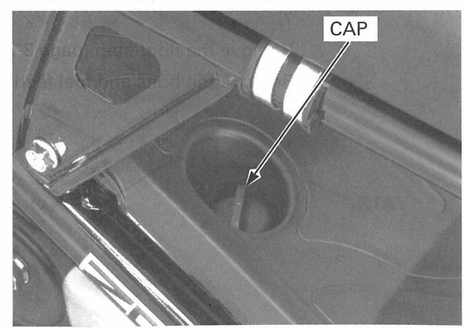


Remove the reserve tank cap and drain the coolant from the reserve tank.

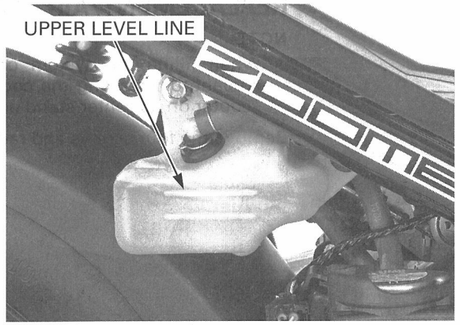
Reinstall the drain bolt with a new O-ring onto the radiator.

TORQUE: 0.9 N·m (0.1 kgf·m, 0.7 lbf·ft)

Reinstall the drain bolt with a new sealing washer onto the cylinder.

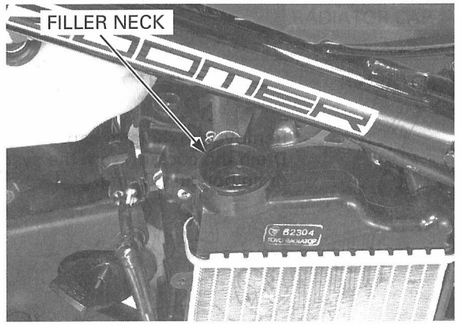


Fill the reserve tank with the recommended coolant to the upper level line.



Fill the system with the recommended coolant through the filler opening to the filler neck.

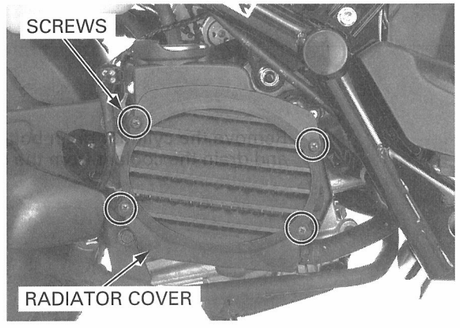
Bleed air from the system as follow:
1. Start the engine and let it idle for 2 – 3 minutes.
2. Snap the throttle three or four times to bleed air from the system.
3. Stop the engine and add coolant to the proper level if necessary. Reinstall the radiator cap.
4. Check the level of coolant in the reserve tank and fill it to the upper level if the level is low.



Install the radiator cap and reserve tank cap.

Install the radiator cover and tighten the screws to the specified torque.

TORQUE: 0.9 N·m (0.1 kgf·m, 0.7 lbf·ft)



WATER PUMP/THERMOSTAT

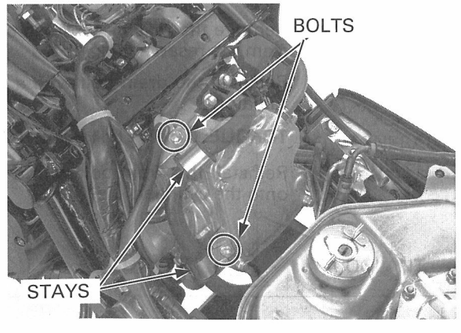
REMOVAL

WATER PUMP

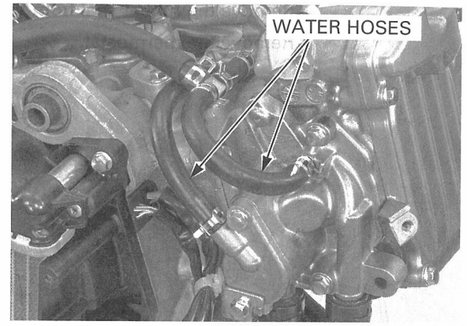
Drain the coolant from the cooling system (page 7-7).

Remove the floor step (page 3-7).

Remove the bolts and fuel feed hose stays.

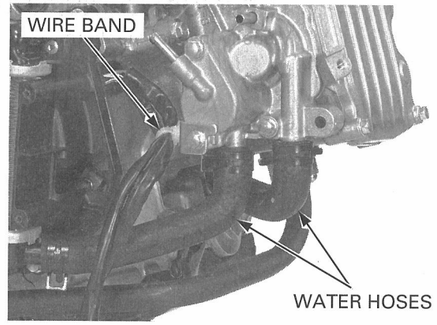


Disconnect the water hoses from the water pump.



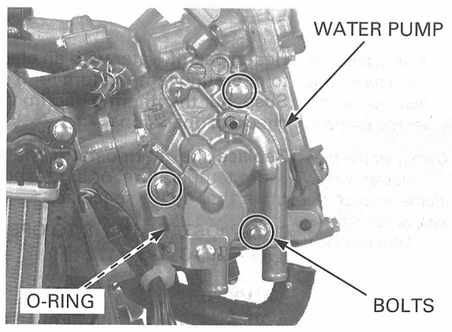
Remove the wire band from the water pump stay.

Disconnect the water hoses.



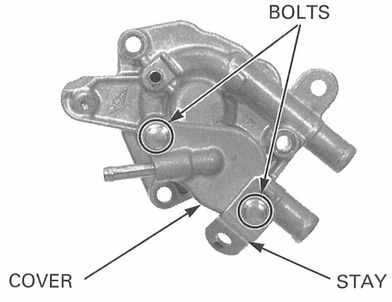
Remove the bolts and water pump.

Remove the O-ring from the water pump.

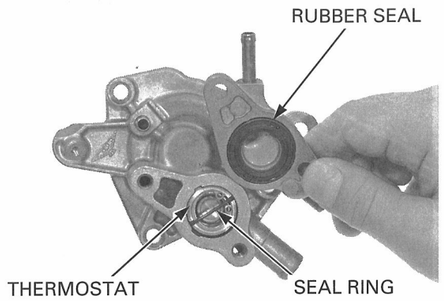


THERMOSTAT

Remove the bolts, stay and thermostat cover.

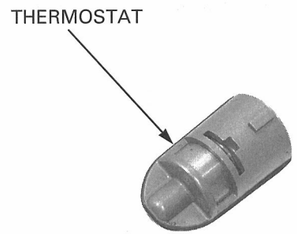


Remove the rubber seal from the thermostat cover.
Remove the thermostat.



THERMOSTAT INSPECTION

Visually inspect the thermostat for damage.



Keep flammable materials away from the electric heating element.

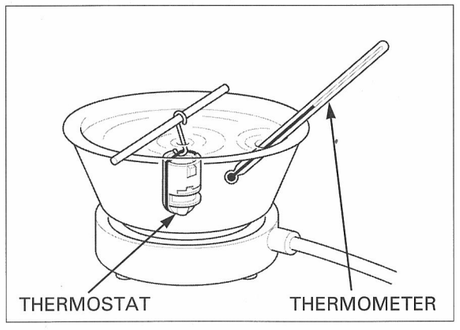
Do not let the thermostat or thermometer touch the pan, or you will get false readings.

Heat a pan of water with an electric heating element to operating temperature for 5 minutes.
Suspend the thermostat in the heated water to check its operation.

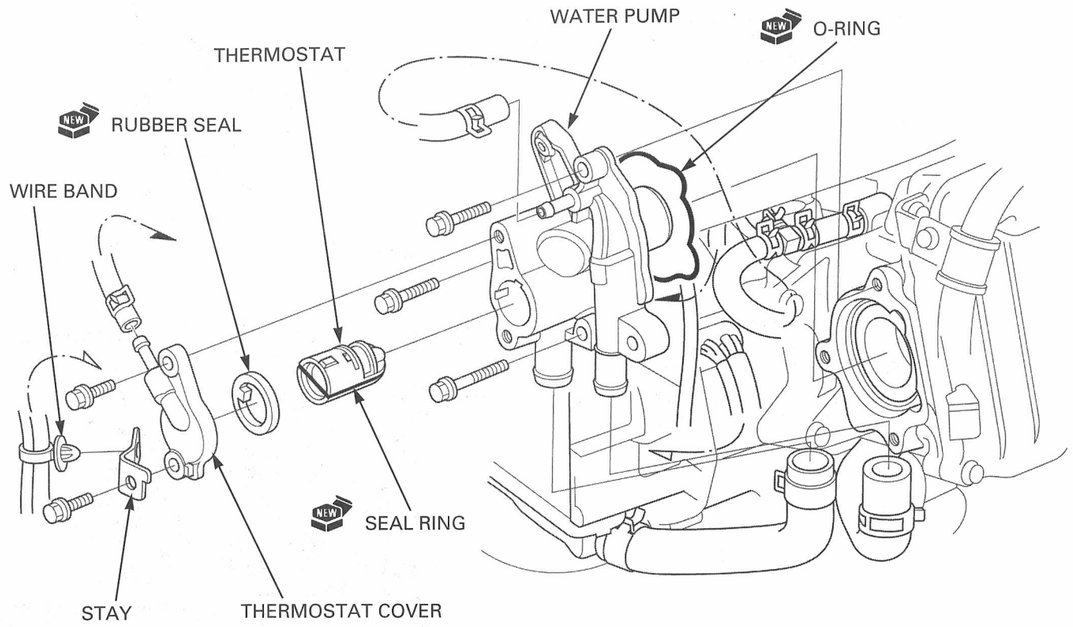
Replace the thermostat if the valve stays open at room temperature, or if it responds at temperatures other than those specified.

THERMOSTAT BEGINS TO OPEN:
74 – 78 °C (165 – 172 °F)

VALVE LIFT:
3.5 mm (0.1 in) minimum at 100 °C (212 °F)

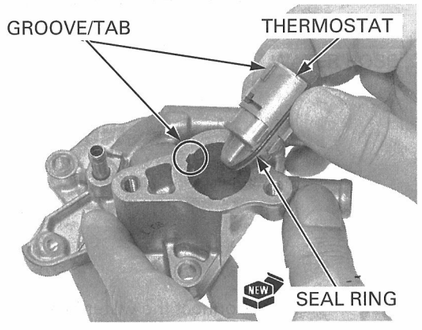


INSTALLATION

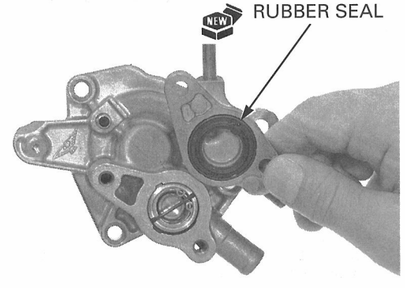


THERMOSTAT

Coat a new seal ring with coolant and install it into the groove of the thermostat.
Install the thermostat into the water pump, aligning the tab of the thermostat with the groove of the water pump.

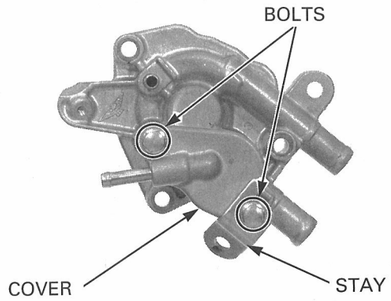


Install a new rubber seal into the thermostat cover groove.



Install the thermostat housing cover to the water pump.

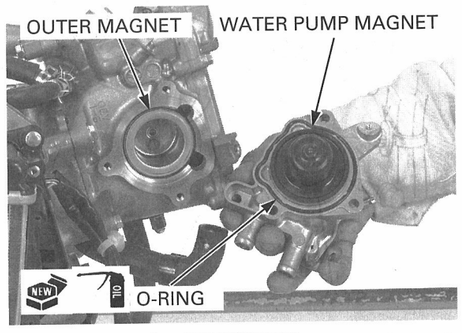
Install the stay to the thermostat housing cover aligning the tab on the stay with the stopper on the thermostat housing cover and tighten the bolts securely.



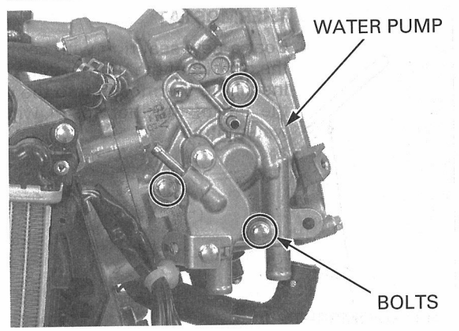
WATER PUMP

Clean the inside of the outer magnet and the water pump magnet, and check that no nuts or bolts are magnetically attached to the magnet.

Coat a new O-ring with engine oil and install it into the groove of the water pump.

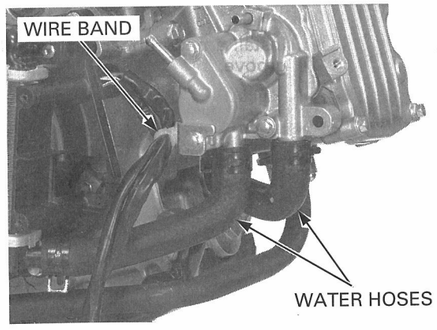


Install the water pump into the cylinder head and tighten the bolts securely.

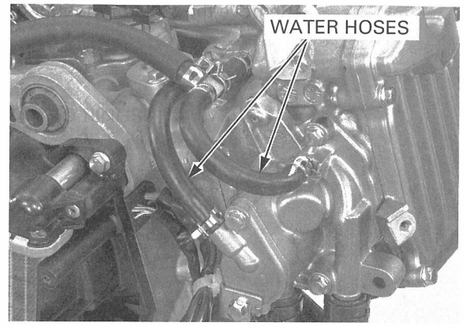


Connect the water hoses.

Install the wire band onto the stay.



Connect the water hoses.

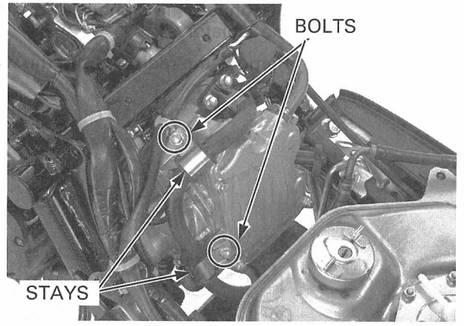


Install the fuel feed hose stay and tighten the bolts to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

Install the floor step (page 3-7).

Fill and bleed the cooling system (page 7-8).



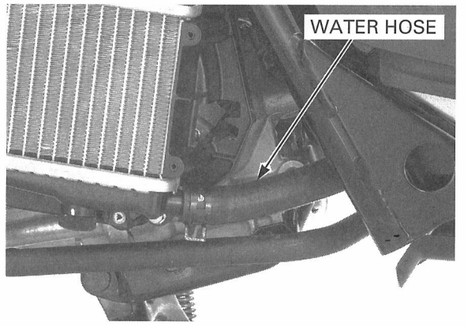
RADIATOR

REMOVAL

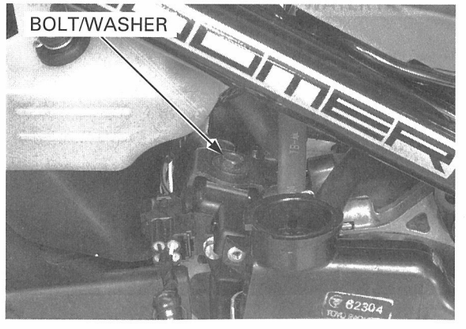
Be careful not to damage the radiator fins while servicing the radiator.

Drain the coolant from the cooling system (page 7-7).

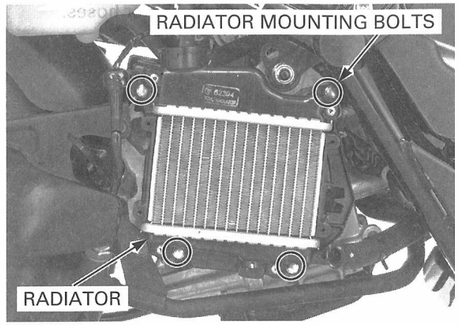
Disconnect the water hose from the radiator.



Remove the rear fender bolt/washer.

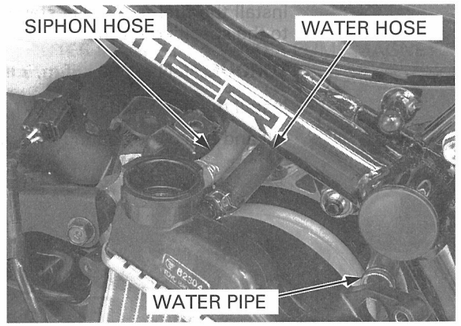


Remove the radiator mounting bolts.

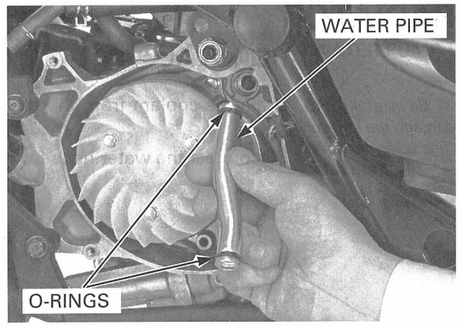


Disconnect the siphon hose and water hoses from the radiator.

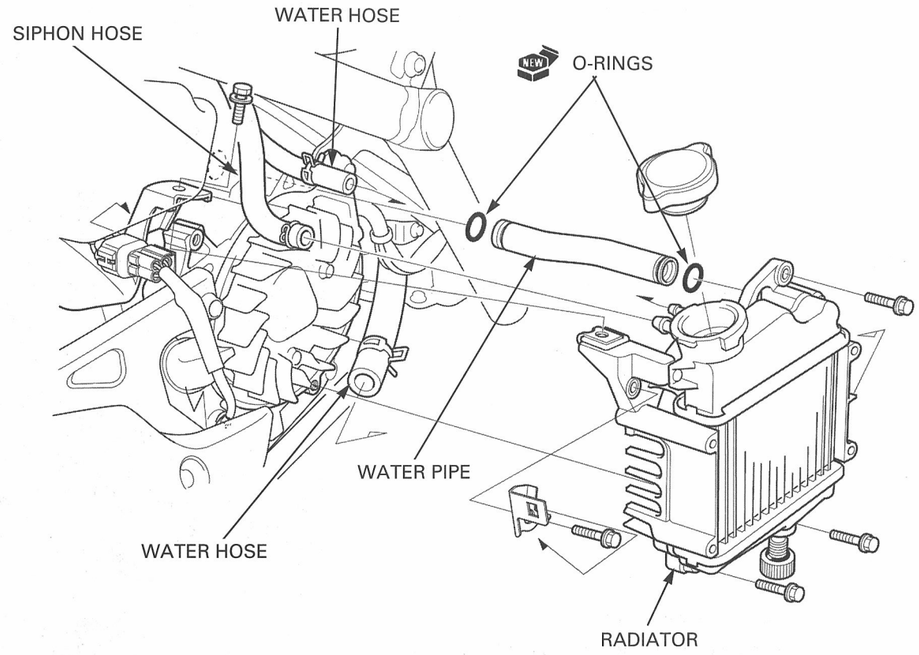
Remove the radiator from the water pipe.



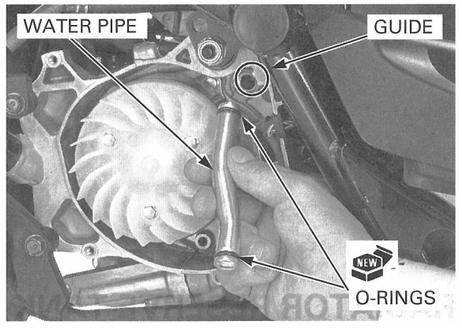
Remove the water pipe and O-rings.



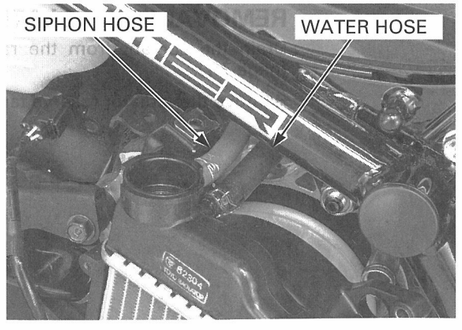
INSTALLATION



Coat the new O-rings with coolant and install them into the grooves of the water pipe.
Install the water pipe and align the guide of the crankcase with the water pipe as shown.

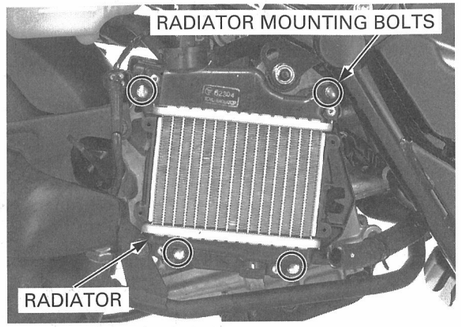


Connect the siphon hose and water hose.

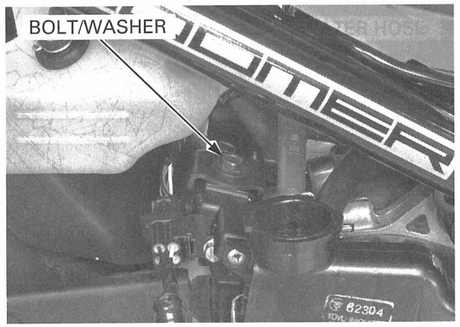


Install the radiator onto the crankcase, aligning the water pipe with the pipe joint of the radiator.

Install and tighten the radiator mounting bolts securely.

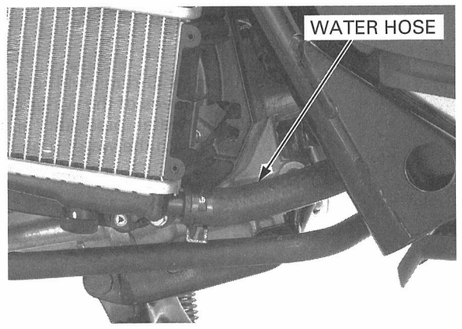


Install and tighten the rear fender bolt securely.



Connect the water hoses.

Fill and bleed the cooling system (page 7-8).

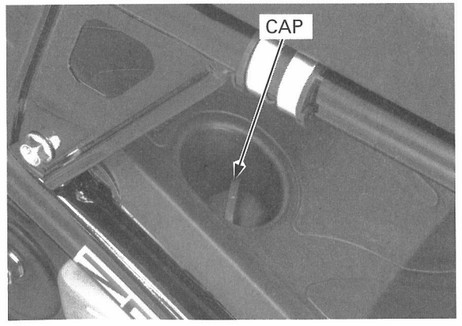


RADIATOR RESERVE TANK

REMOVAL/INSTALLATION

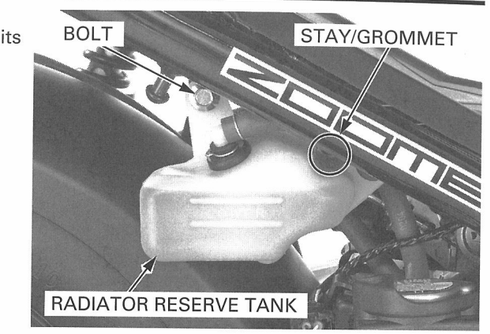
Drain the coolant from the radiator reserve tank (page 7-7).

Remove the radiator reserve tank cap.



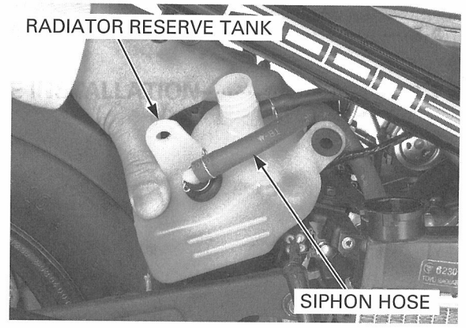
Remove the bolt.

Remove the radiator reserve tank by releasing its grommet from the frame stay.



Disconnect the siphon hose from the reserve tank.

Installation is in the reverse order of removal.



MEMO

8. ENGINE REMOVAL/INSTALLATION

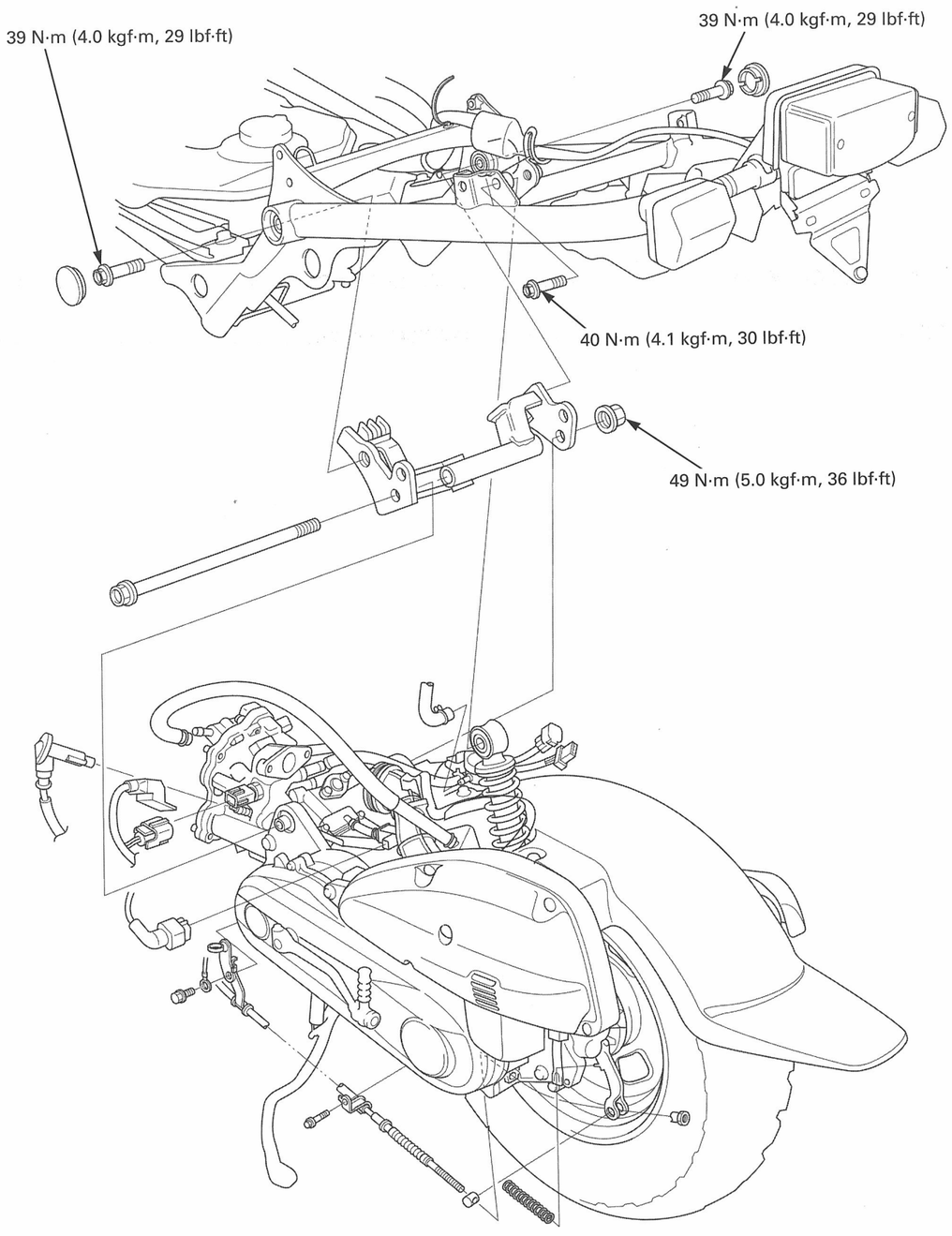
COMPONENT LOCATIONS 8-2

SERVICE INFORMATION 8-3

ENGINE REMOVAL 8-4

ENGINE INSTALLATION 8-7

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- During engine removal and installation, support the scooter using a hoist or equivalent.
- Support the engine using a jack or other adjustable support to ease of engine mounting bolt removal.
- When removing/installing the engine, tape the frame around the engine beforehand for frame protection.
- The following components require engine removal for service.
  - Crankshaft/piston/cylinder (page 13-3)
- The following components can be serviced with the engine installed in the frame.
  - Kick starter/drive pulley/driven pulley/clutch (page 10-3)
  - Final reduction (page 11-3)
  - Alternator/starter (page 12-3)
  - Cylinder head/valves (page 9-3)
  - Water pump (page 7-3)
  - Throttle body (page 6-55)
  - Oil pump (page 5-4)

SPECIFICATION

ITEM		SPECIFICATIONS
Engine dry weight		21.1 kg (46.5 lbs)
Coolant capacity	Radiator and engine	0.28 liter (0.30 US qt, 0.25 Imp qt)
Engine oil capacity	At draining	0.6 liter (0.6 US qt, 0.5 Imp qt)
	At disassembly	0.7 liter (0.7 US qt, 0.6 Imp qt)

TORQUE VALUES

Engine hanger link bolt (frame side)	39 N·m (4.0 kgf·m, 29 lbf·ft)	
Engine mounting nut (engine side)	49 N·m (5.0 kgf·m, 36 lbf·ft)	U-nut
Rear shock absorber mounting bolt (upper)	40 N·m (4.1 kgf·m, 30 lbf·ft)	

ENGINE REMOVAL

Remove the floor step (page 3-7).

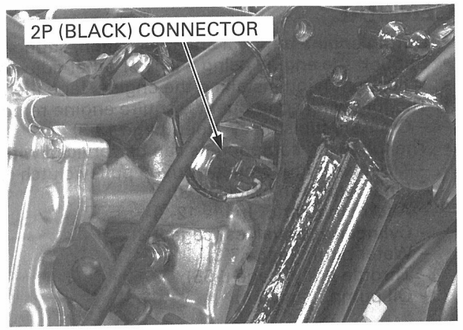
Drain the engine oil (page 4-10).
Relieve the fuel pressure and disconnect the quick connect fitting (page 6-46).
Drain the coolant from the cooling system (page 7-7).

NOTICE

Install the radiator cover to prevent the radiator fin from damage.

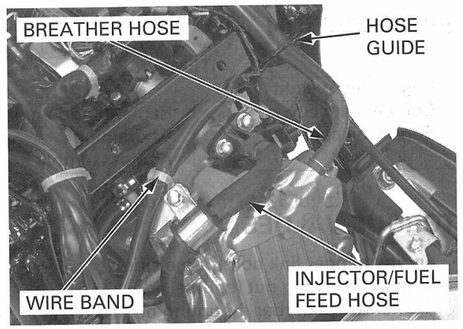
Remove the spark plug cap from the spark plug (page 4-6).

Disconnect the ECT sensor 2P (Black) connector.

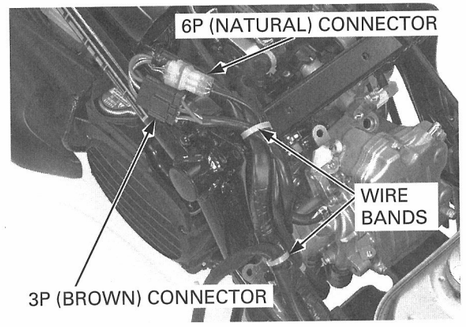


Remove the injector/fuel feed hose (page 6-61).

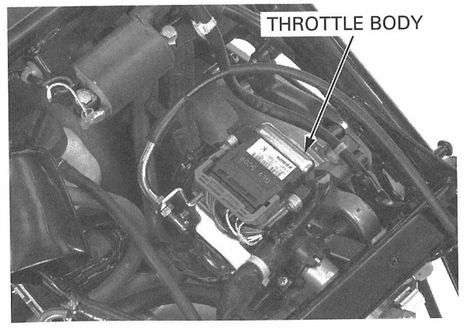
Disconnect the crankcase breather hose from the cylinder head cover and hose guide.
Remove the wire band from the stay.



Disconnect the alternator/starter 3P (Natural) and 6P (Brown) connectors.
Remove the alternator/starter wire from the wire bands.

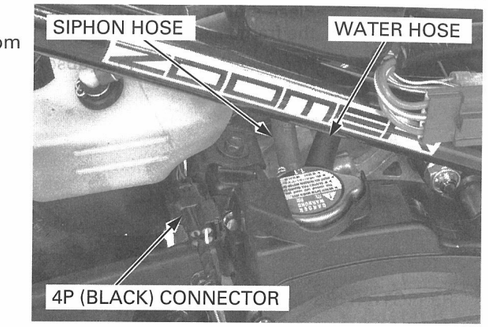


Remove the throttle body (page 6-55).

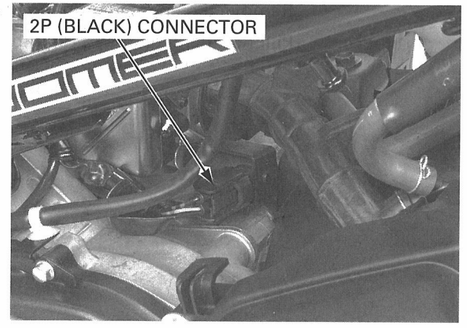


Disconnect the O_2 sensor 4P (Black) connector.

Disconnect the siphon hose and water hose from the radiator.

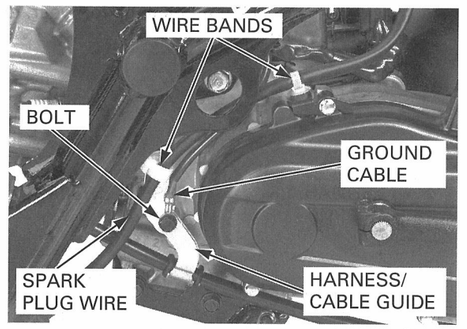


Disconnect the PCV solenoid valve 2P (Black) connector.



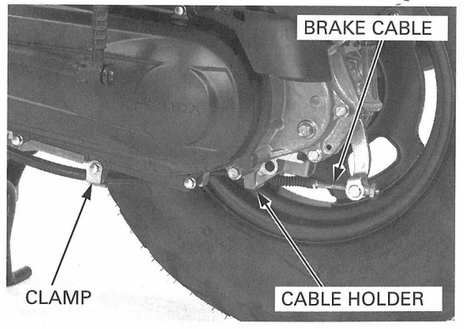
Remove the spark plug wire from the wire bands.

Remove the bolt, ground cable and harness/cable guide



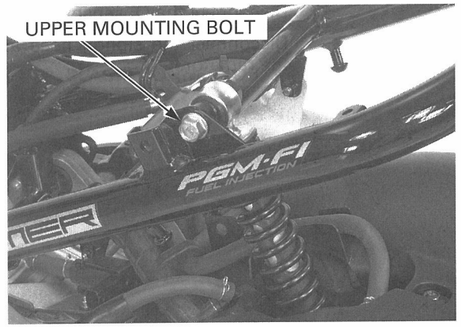
Remove the rear brake cable from the brake arm (page 15-5).

Remove the rear brake cable from the cable holder and the clamp.



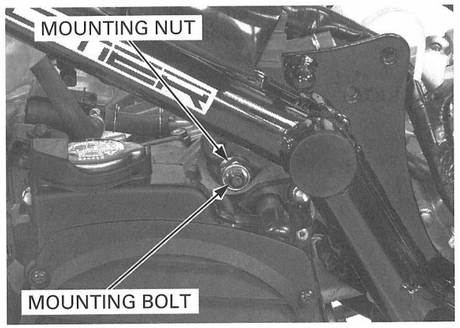
Place a floor jack or other adjustable support under the frame.

Remove the rear shock absorber upper mounting bolt.



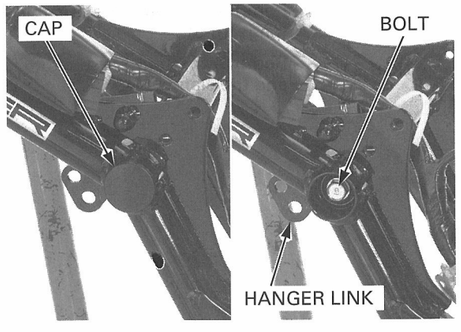
Remove the engine mounting nut.

Pull out the engine mounting bolt, then remove the engine from the frame.

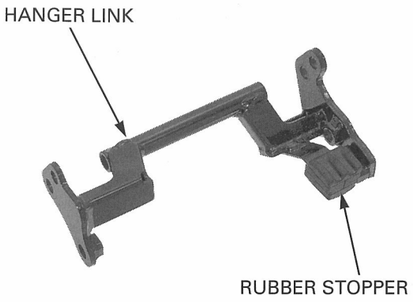


Check the bushings for wear, deterioration or damage.

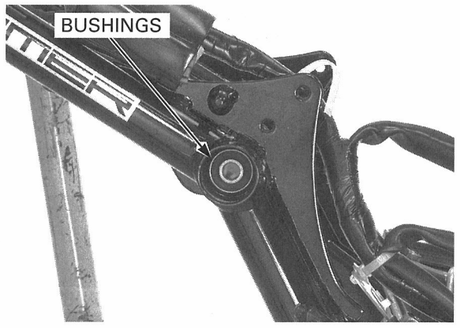
Remove the pivot caps, bolts and engine hanger link.



Check the rubber stopper of the engine hanger link for damage, wear or deterioration.



Check the bushings for wear, deterioration or damage.

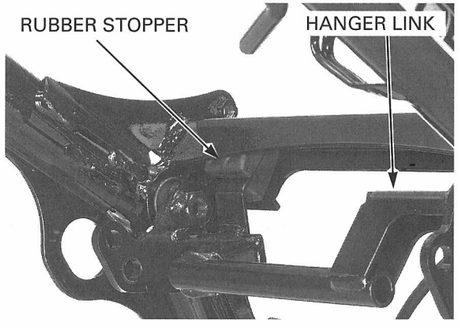


ENGINE INSTALLATION

NOTE:

- Before installing the engine, route the wires, hoses and cables properly (page 1-15).
- The jack height must be continually adjusted to relieve stress from the mounting fasteners.

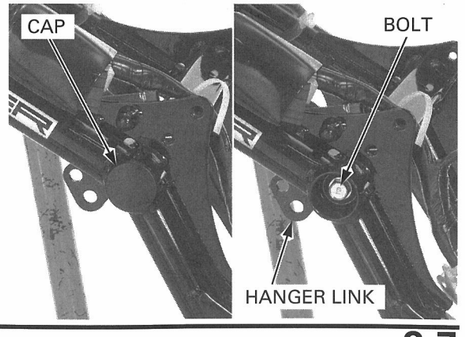
Install the engine hanger link, aligning the rubber stopper with the frame.



Install and tighten the engine hanger link bolts to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

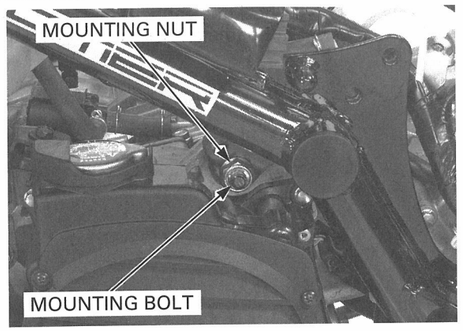
Install the pivot caps.



Set the engine to the frame and install the engine mounting bolt from the left side.

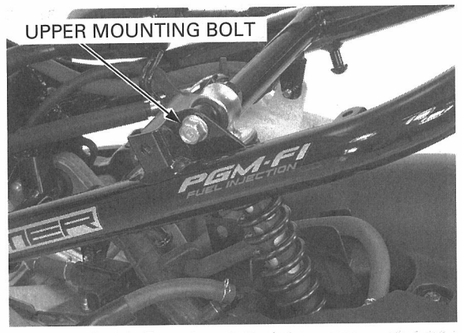
Tighten the engine mounting nut to the specified torque.

TORQUE: 49 N·m (5.0 kgf·m, 36 lbf·ft)



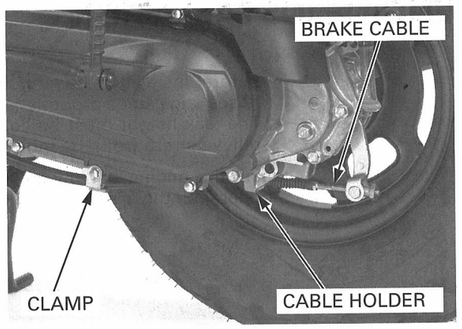
Tighten the rear shock absorber upper mounting bolt to the specified torque.

TORQUE: 40 N·m (4.1 kgf·m, 30 lbf·ft)



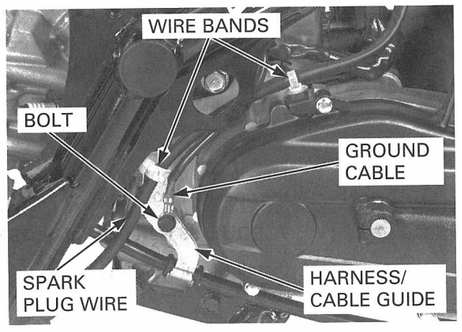
Install the brake cable to the clamp and the cable holder.

Install the rear brake arm adjusting nut, joint pin and spring.

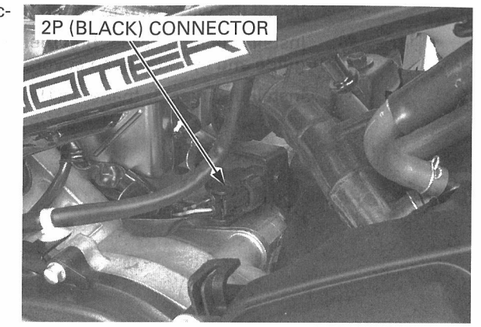


Install harness/cable guide and ground wire. Install and tighten the bolt securely.

Install the spark plug wire to the wire bands.

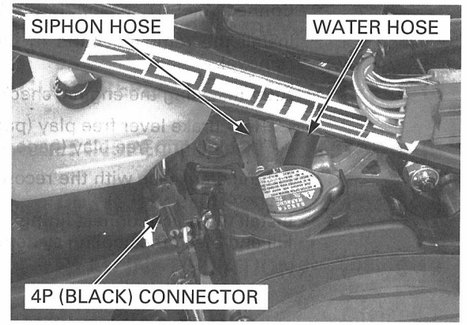


Connect the PCV solenoid valve 2P (Black) connector.

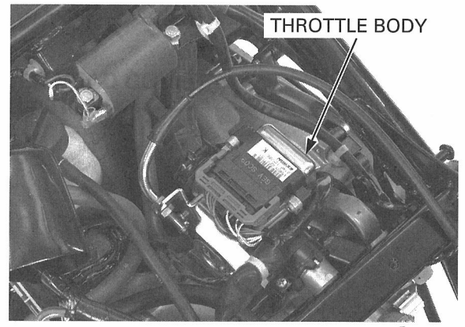


Connect the O_2 sensor 4P (Black) connector.

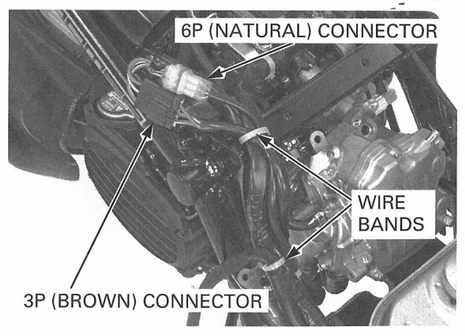
Connect the siphon hose and water hose to the radiator.



Install the throttle body (page 6-55).



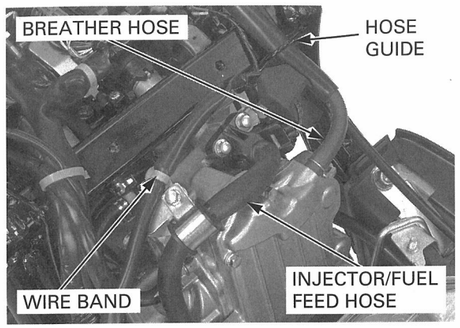
Install the alternator/stator wire to the wire bands. Connect the alternator/stator 3P (Brown) and 6P (Natural) connectors.



Install the wire band to the stay.

Install the crankcase breather hose to the hose guide and cylinder head cover.

Install the injector (page 6-61).



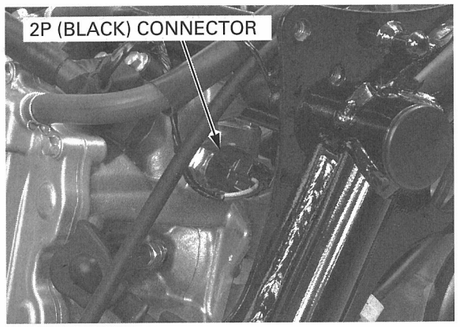
Connect the ECT sensor 2P (Black) connector.

Install the removed parts in the reverse order of removal.

After installing the engine, check the following:

- Rear brake lever free play (page 4-13)
- Throttle grip free play (page 4-4)

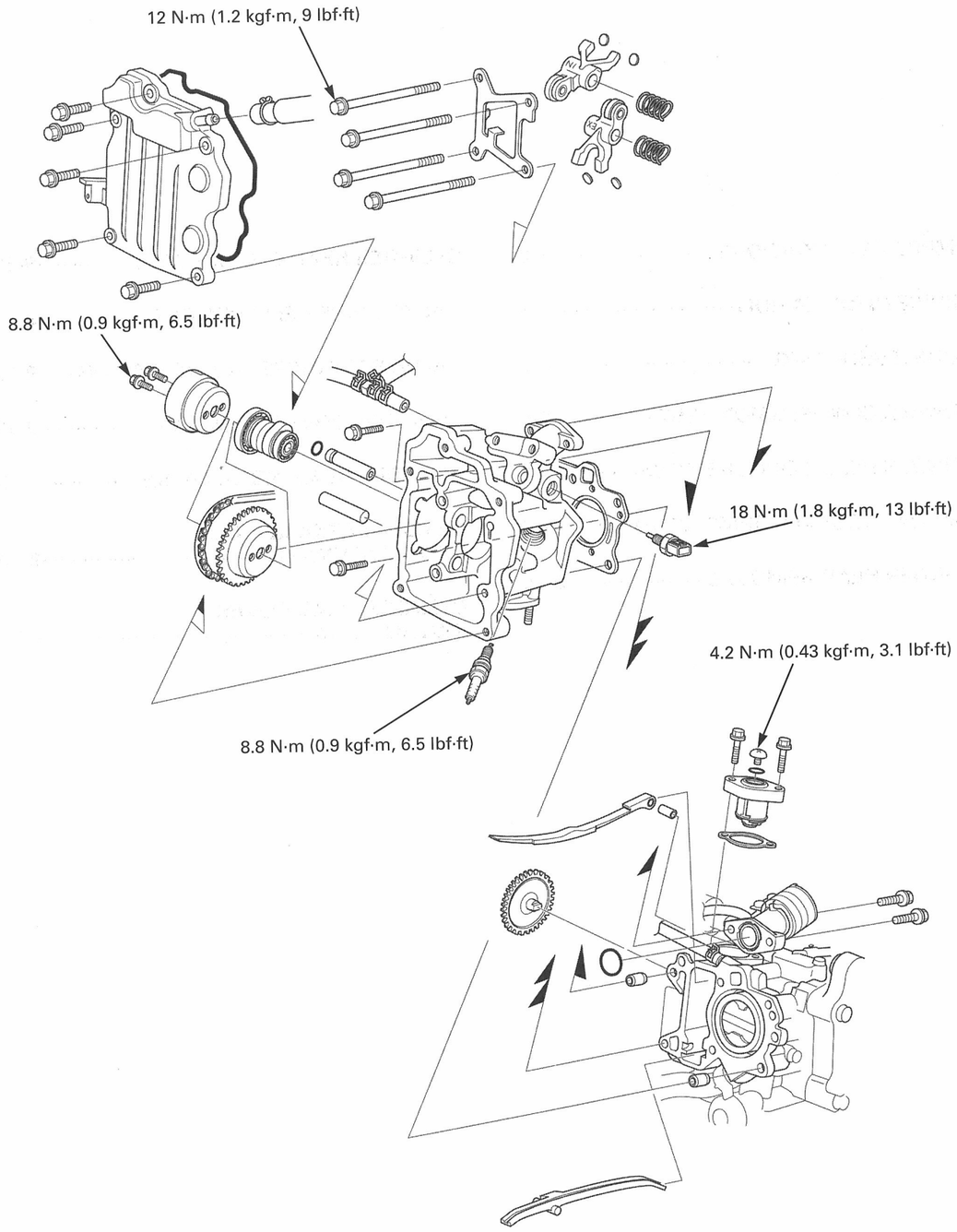
Fill the crankcase with the recommended engine oil (page 4-10).
Install the quick connect fitting (page 6-47).
Fill and bleed the cooling system (page 7-8).



9. CYLINDER HEAD/VALVES

COMPONENT LOCATIONS 9-2
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CYLINDER COMPRESSION TEST 9-6
CYLINDER HEAD COVER REMOVAL 9-6
CAMSHAFT/ROCKER ARMS REMOVAL 9-7
CYLINDER HEAD REMOVAL 9-10
CYLINDER HEAD DISASSEMBLY 9-11
VALVE GUIDE REPLACEMENT 9-14
VALVE SEAT INSPECTION/REFACING 9-15
CYLINDER HEAD ASSEMBLY 9-18
CYLINDER HEAD INSTALLATION 9-19
CAMSHAFT/ROCKER ARM INSTALLATION 9-20
CYLINDER HEAD COVER INSTALLATION 9-23

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- This section covers service of the cylinder head, valves, rocker arms and camshaft.
- The cylinder head and valves can be serviced with the engine installed in the frame.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.
- Clean all disassembled parts with cleaning solvent and dry them by blowing them off with compressed air before inspection.
- Camshaft and rocker arm lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling the cylinder head.
- Be careful not to damage the mating surfaces when removing the cylinder head cover and cylinder head.

SPECIFICATIONS

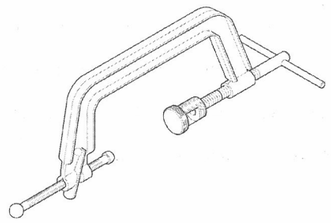
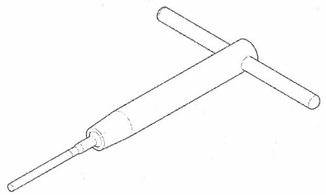
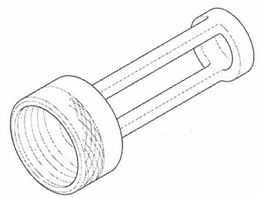
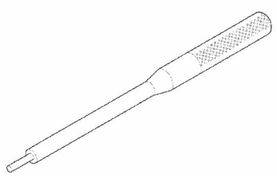
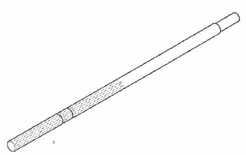
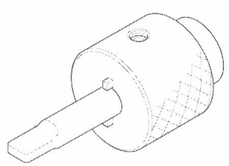
Unit: mm (in)

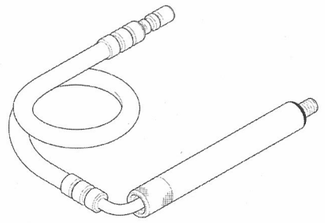
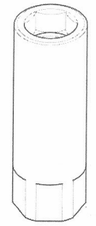
ITEM			STANDARD	SERVICE LIMIT
Cylinder compression			1,275 kPa (13.0 kgf/cm², 185 psi) at 950 rpm	–
Cylinder head warpage			–	0.05 (0.002)
Valve, valve guide	Valve clearance	IN	0.10 ±0.03 (0.004 ±0.001)	–
		EX	0.21 ±0.03 (0.008 ±0.001)	–
	Valve stem O.D.	IN	3.475 – 3.490 (0.1368 – 0.1374)	3.465 (0.1364)
		EX	3.465 – 3.480 (0.1364 – 0.1370)	3.455 (0.1360)
	Valve guide I.D.	IN/EX	3.500 – 3.512 (0.1378 – 0.1383)	3.54 (0.139)
	Stem-to-guide clearance	IN	0.010 – 0.037 (0.0004 – 0.0015)	0.075 (0.0030)
		EX	0.020 – 0.047 (0.0008 – 0.0019)	0.085 (0.0033)
	Valve guide projection above cylinder head	IN	9.30 – 9.50 (0.366 – 0.374)	–
		EX	9.30 – 9.50 (0.366 – 0.374)	–
	Valve seat width	IN/EX	0.8 (0.03)	1.3 (0.05)
Valve spring free length		IN/EX	37.11 (1.461)	35.8 (1.41)
Rocker arm	Rocker arm I.D.	IN/EX	10.000 – 10.015 (0.3937 – 0.3943)	10.10 (0.400)
	Rocker arm shaft O.D.	IN/EX	9.972 – 9.987 (0.3926 – 0.3932)	9.91 (0.390)
	Side spring free length		16.0 (0.63)	14.5 (0.57)
Camshaft	Cam lobe height	IN	30.7867 – 31.0268 (1.21208 – 1.22153)	30.75 (1.211)
		EX	29.9308 – 30.1708 (1.17838 – 1.18782)	29.90 (1.177)

TORQUE VALUES

Cylinder head bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply oil to the threads and flange surface.
Cam sprocket bolt	8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)	Apply oil to the threads and flange surface.
Cam chain tensioner lifter screw	4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)	
Spark plug	8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)	
ECT sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)	

TOOLS

Valve spring compressor 07757-0010000 	Seat cutter, 15 mm (45° IN) 07VMH-GCR0100  or equivalent commercially available	Seat cutter, 13 mm (45° EX) 07VMH-GCR0300  or equivalent commercially available
Flat cutter, 13 mm (32° EX) 07VMH-GCR0400  or equivalent commercially available	Flat cutter, 15 mm (32° IN) 07VMH-GCR0200  or equivalent commercially available	Interior cutter, 13 mm (60° EX) 07VMH-GCR0500  or equivalent commercially available
Interior cutter, 17 mm (60° IN) 07780-0014600  or equivalent commercially available	Cutter holder, 3.5 mm 07HMH-KT70200  or equivalent commercially available	Valve spring compressor attachment 070ME-MCW0100 
Valve guide driver 07HMD-KT70100 	Valve guide reamer, 3.510 mm 07HMH-KT70101 	Cam chain tensioner stopper 070MG-0010100 

Compression gauge attachment 07NMJ-MT70101 	Spark plug wrench 070MA-GEZ0100 

TROUBLESHOOTING

- Engine top-end problems usually affect engine performance. These problems can be diagnosed by a compression test or by tracing engine noises to the top-end with a sounding rod or stethoscope.
- If the performance is poor at low speeds, check for white smoke in the engine breather drain hose. If the hose is smoky, check for a seized piston ring (page 13-8).

Compression too low, hard starting or poor performance at low speed
- Valves:
  - Incorrect valve clearance
  - Burned or bent valve
  - Incorrect valve timing
  - Broken valve spring
  - Uneven valve seating
- Cylinder head:
  - Leaking or damaged head gasket
  - Warped or cracked cylinder head
  - Loose spark plug
- Worn cylinder, piston or piston rings (page 13-8)

Compression too high, overheating or knocking
- Excessive carbon build-up on piston head or on combustion chamber

Excessive smoke
- Worn valve stem or valve guide
- Damaged stem seal
- Worn cylinder, piston or piston rings (page 13-8)

Excessive noise
- Incorrect valve clearance
- Sticking valve or broken valve spring
- Worn or damaged camshaft
- Worn or damaged cam chain
- Worn cam sprocket teeth
- Worn rocker arm and/or shaft
- Worn or damaged cam chain tensioner
- Worn cylinder, piston or piston rings (page 13-8)

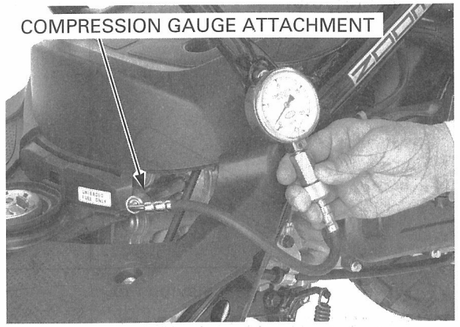
Rough idle
- Low cylinder compression

CYLINDER COMPRESSION TEST

Warm up the engine to normal operating temperature.
Stop the engine and remove the spark plug cap and spark plug (page 4-6).

Connect a compression gauge and attachment to the spark plug hole.

TOOL:
Compression gauge attachment 07NMJ-MT70101



To avoid discharging the battery, do not operate the starter motor for more than 7 seconds.

Open the throttle all the way and crank the engine with the kick starter or electric starter until the gauge reading stops rising.
The maximum reading is usually reached within 4 – 7 seconds when using electric starter.

COMPRESSION PRESSURE:
1,275 kPa (13.0 kg/cm², 185 psi) at 950 rpm

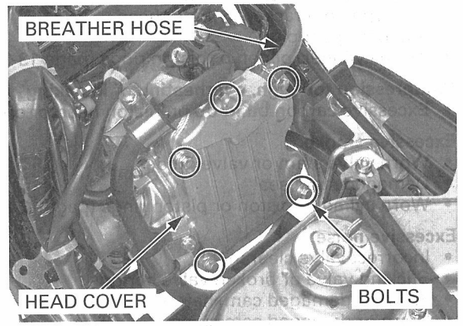
Low compression can be caused by:
- Blown cylinder head gasket
- Improper valve adjustment
- Valve leakage
- Worn piston ring or cylinder

High compression can be caused by:
- Carbon deposits in the combustion chamber or on piston head

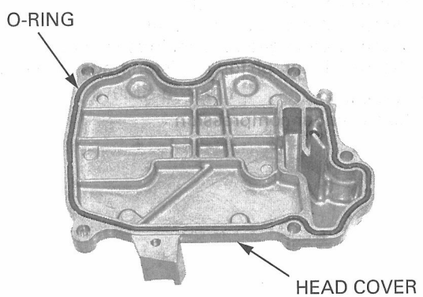
CYLINDER HEAD COVER REMOVAL

Remove the floor step (page 3-7).

Disconnect the engine breather hose.
Remove the bolts and cylinder head cover.



Remove the O-ring from the cylinder head cover.

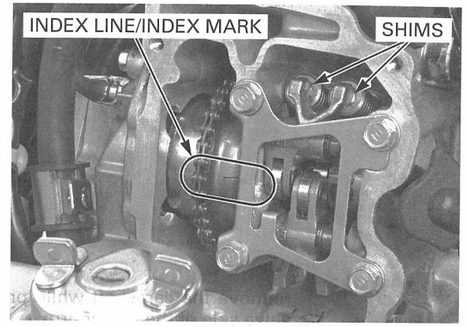


CAMSHAFT/ROCKER ARMS REMOVAL

Remove the following:

- Fuel tank (page 6-52)
- Belt case cover (page 10-6)
- Water pump (page 7-8)
- Cylinder head cover (page 9-6)

Rotate the drive pulley (crankshaft) counterclockwise and align the index line on the cam sprocket with the index mark on the stopper plate.
Make sure the cam lobe faces the cylinder side (TDC on the compression stroke).
If the cam lobe is facing the rocker arm side (TDC on exhaust stroke), rotate the crankshaft counterclockwise 360° (one full turn) so the cam lobe faces the cylinder side.



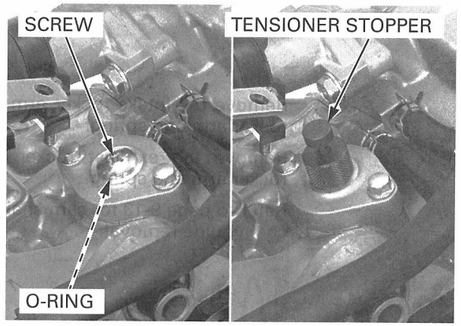
Move the rocker arms to the spring side and remove the shims.

NOTE:
- Do not allow the shims to fall into the crankcase.
- Mark all shims to ensure correct reassembly in their original locations.
- The shims can be easily removed with tweezers or a magnet.

Remove the screw and O-ring from the cam chain tensioner lifter.

Turn the tensioner shaft clockwise with a special tool to hold the tensioner in the fully retracted position.

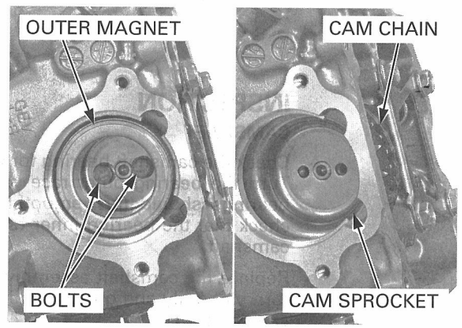
TOOL:
Cam chain tensioner stopper 070MG-0010100



Remove the two bolts and outer magnet while holding the crankshaft.

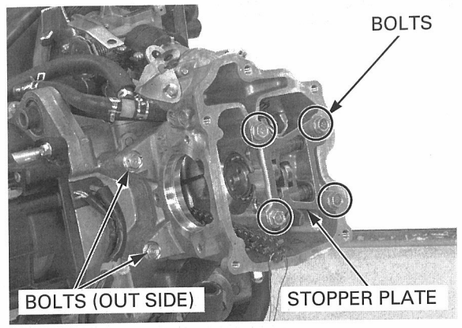
Remove the cam sprocket from the camshaft and cam chain from the cam sprocket.

Attach a piece of wire to the cam chain to prevent it from falling into the crankcase.

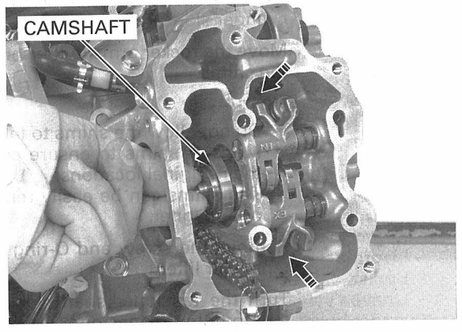


Loosen the outside cylinder head bolts.

Remove the bolts and stopper plate.



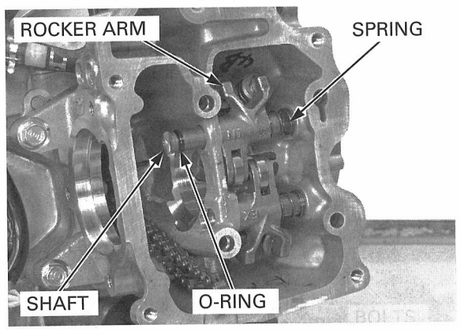
Remove the camshaft while pressing down on the valve side of the rocker arm.



Remove the intake rocker arm shaft, O-ring, intake rocker arm and spring.

Remove the exhaust rocker arm shaft, exhaust rocker arm and spring.

Refer to page 9-13 for cam chain tensioner and cam chain guide removal.

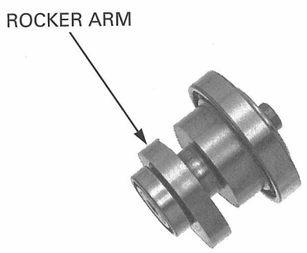


INSPECTION

CAMSHAFT

Check the camshaft bearing for wear or damage. Turn the bearing outer race with your finger. The bearings should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the camshaft.

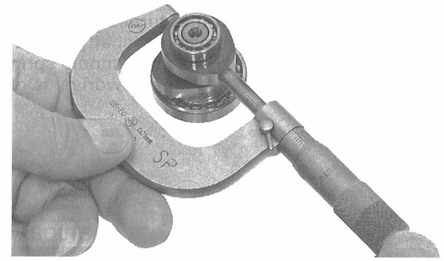
Replace the camshaft assembly if the race does not turn smoothly and quietly, or if it fits loosely on the camshaft.



Check the cam lobe for excessive wear and damage.

Measure the height of each cam lobe.

SERVICE LIMITS:
IN: 30.75 mm (1.211 in)
EX: 29.90 mm (1.177 in)



ROCKER ARM/SHAFT

Check the rocker arm shafts and rocker arms for wear or damage.

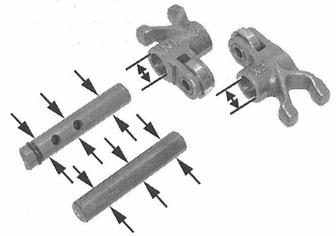
Check the oil holes for clogging.

Measure the I.D. of each rocker arm.

SERVICE LIMITS: IN/EX:10.10 mm (0.400 in)

Measure the O.D. of each rocker arm shaft.

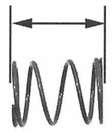
SERVICE LIMITS: IN/EX:9.91 mm (0.390 in)



SIDE SPRING

Measure the free length of the side springs.

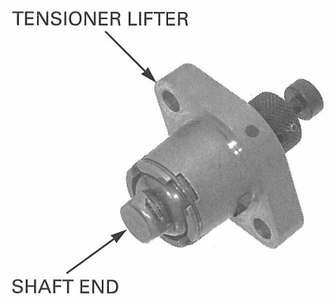
SERVICE LIMITS: IN/EX:14.5 mm (0.57 in)



CAM CHAIN TENSIONER LIFTER

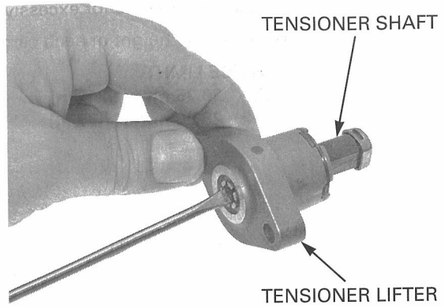
Remove the two bolts and tensioner lifter (page 9-7).

Check the tensioner shaft end for wear or damage.



Check the lifter operation:

- The tensioner shaft should not go into the body when it is pushed.
- When it is turned clockwise with a screwdriver, the tensioner shaft should be pulled into the body. The shaft should spring out of the body as soon as the screwdriver is released.



CYLINDER HEAD REMOVAL

Remove the following:

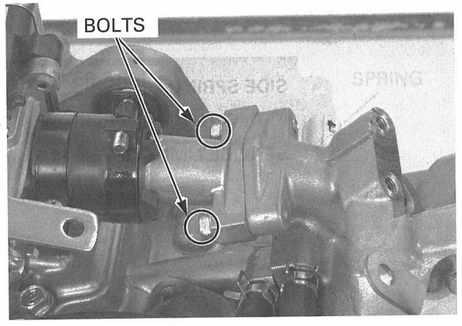
- Muffler (page 3-9)
- Injector (page 6-61)
- Camshaft/rocker arm (page 9-7)

Disconnect the ECT sensor 2P (Black) connector (page 6-63).

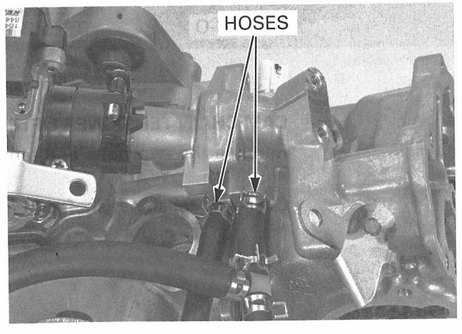
NOTE:

- Loosen the spark plug and ECT sensor when disassembling the cylinder head.

Remove the intake pipe bolts.

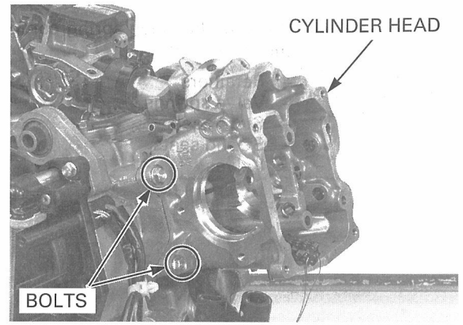


Disconnect the water hoses.



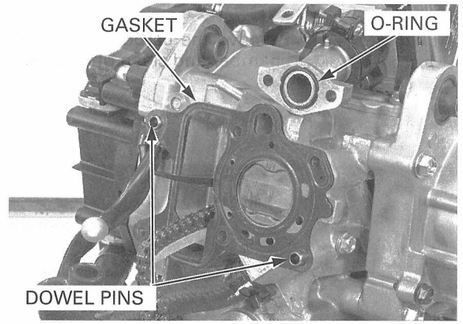
Be careful not to damage the mating surface.

Remove the bolts and cylinder head.



Remove the gasket and dowel pins.

Remove the O-ring from the intake pipe groove.

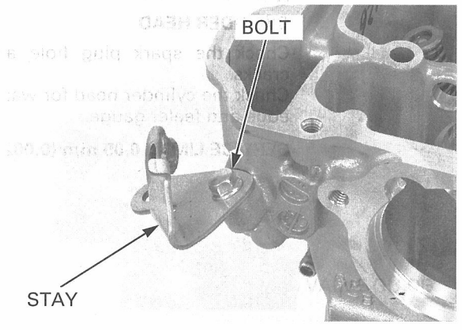


CYLINDER HEAD DISASSEMBLY

Remove the followings:

- Spark plug (page 4-6)
- ECT sensor (page 6-63)

Remove the bolt and stay.

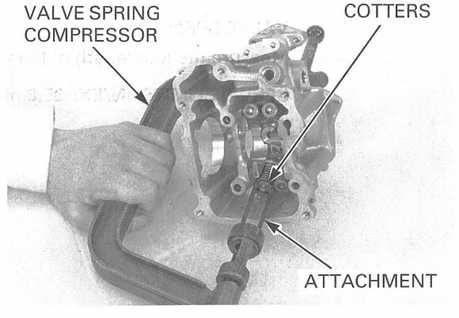


To prevent loss of tension, do not compress the valve springs more than necessary to remove the cotters.

Remove the valve spring cotters using the special tools.

TOOLS:

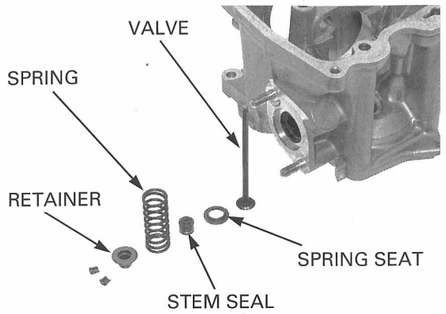
Valve spring compressor	**07757-0010000**
Valve spring compressor attachment	**070ME-MCW0100**



Mark all parts during disassembly so they can be placed back in their original locations.

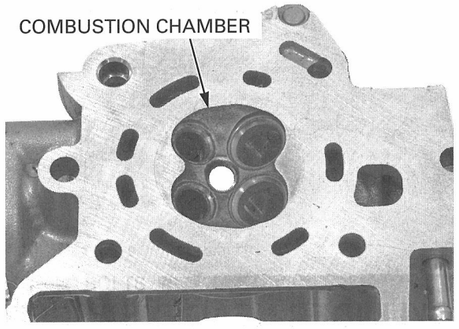
Remove the valve spring compressor, then remove the following:

- Retainers
- Valve springs
- Stem seals
- Spring seats
- Valves



Avoid damaging the mating and valve seat surfaces.

Remove the carbon deposits from the combustion chamber and clean off the head gasket surface.

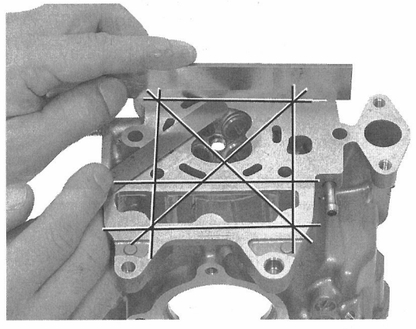


INSPECTION

CYLINDER HEAD

Check the spark plug hole and valve areas for cracks.
Check the cylinder head for warpage with a straight edge and feeler gauge.

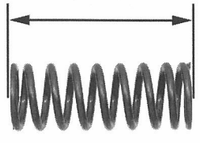
SERVICE LIMIT: 0.05 mm (0.002 in)



VALVE SPRING

Measure the free length of the valve springs.

SERVICE LIMITS: IN/EX: 35.8 mm (1.41 in)

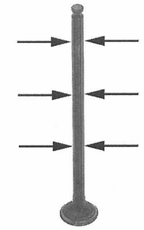


VALVE/VALVE GUIDE

Check that the valve moves smoothly in the guide.
Check each valve for bends, burns, scratches or abnormal wear.

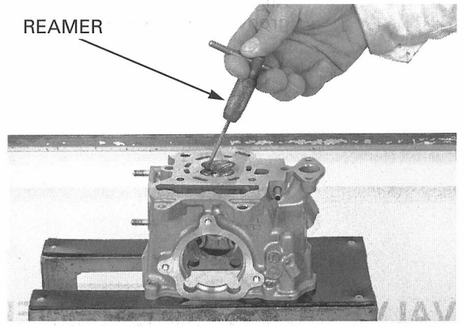
Measure each valve stem O.D. and record it.

SERVICE LIMITS:
IN: 3.465 mm (0.1364 in)
EX: 3.455 mm (0.1360 in)



Ream the valve guide to remove any carbon build up before measuring the guide.
Insert the reamer from the combustion chamber side of the head and always rotate the reamer clockwise.

TOOL:
Valve guide reamer, 3.510 mm 07HMH-KT70101



Measure each valve guide I.D. and record it.

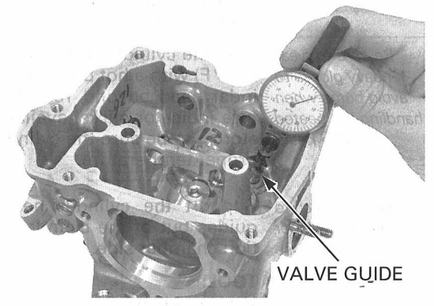
SERVICE LIMITS: IN/EX:3.54 mm (0.139 in)

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

SERVICE LIMITS:
IN: 0.075 mm (0.0030 in)
EX: 0.085 mm (0.0033 in)

Inspect and reface the valve seats whenever the valve guides are replaced (page 9-14).

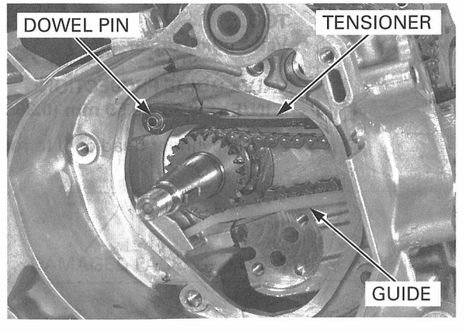
If the stem-to-guide clearance exceeds the service limit, determine if a new guide with standard dimensions would bring the clearance within tolerance.
If so, replace any guides as necessary and ream to fit.
If the stem-to-guide clearance exceeds the service limit with new guide, also replace the valve.



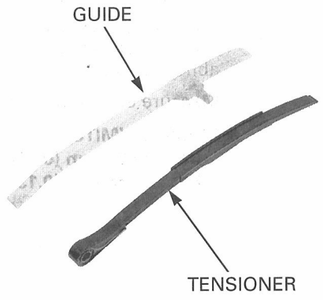
CAM CHAIN TENSIONER/GUIDE

Remove the oil pump (page 5-4).

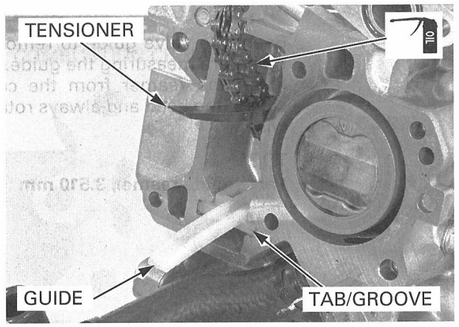
Remove the dowel pin and cam chain tensioner.
Remove the cam chain guide from the cylinder and crankcase grooves.



Check the tensioner and guide for excessive wear or damage.
If necessary, replace them using the following procedure.



Installation is in the reverse order of removal.
Align the tab on the cam chain guide with the groove on the crankcase.



VALVE GUIDE REPLACEMENT

Chill the replacement valve guides in a freezer for about 1 hour.

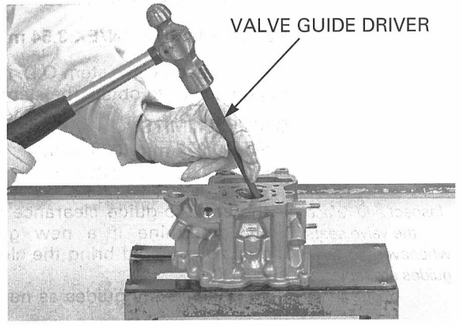
Be sure to wear heavy gloves to avoid burns when handling the heated cylinder head.

Heat the cylinder head to 130 °C – 140 °C (275 °F – 290 °F) with a hot plate or oven. Do not heat the cylinder head beyond 150 °C (300 °F). Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

Using a torch to heat the cylinder head may cause warpage.

Support the cylinder head and drive the valve guides out of the cylinder head from the combustion chamber side.

TOOL:
Valve guide driver 07HMD-KT70100

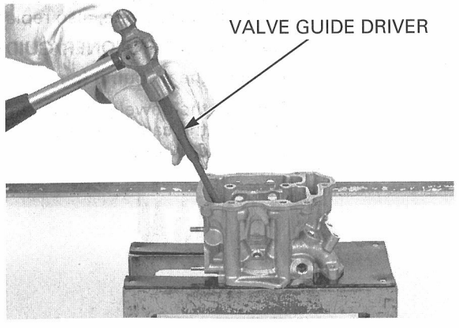


Drive the new guides into the cylinder head from the camshaft side while the cylinder head is still heated.

TOOL:
Valve guide driver 07HMD-KT70100

VALVE GUIDE PROJECTION:
IN/EX: 9.30 – 9.50 mm (0.366 – 0.374 in)

Let the cylinder head cool to room temperature.



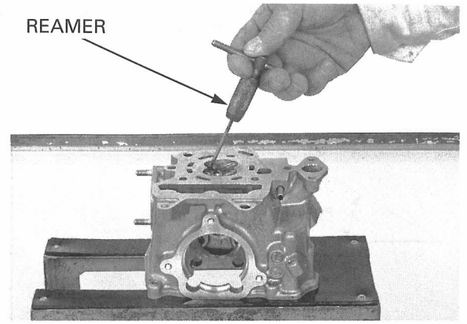
Ream the new valve guides after installation.

Take care not to tilt or lean the reamer in the guide while reaming.
Use cutting oil on the reamer during this operation.

Insert the reamer from the combustion chamber side of the head and also always rotate the reamer clockwise.

TOOL:
Valve guide reamer, 3.510 mm 07HMH-KT70101

Clean the cylinder head thoroughly to remove any metal particles after reaming and reface the valve seat as described below.

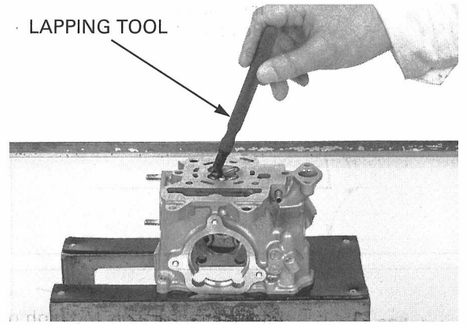


VALVE SEAT INSPECTION/REFACING

INSPECTION

Clean the intake and exhaust valves thoroughly to remove carbon deposits.

Apply a light coating of Prussian Blue to the valve seats.
Tap the valve against the valve seat several times using a hand-lapping tool, without rotating the valve, to make a clear pattern.

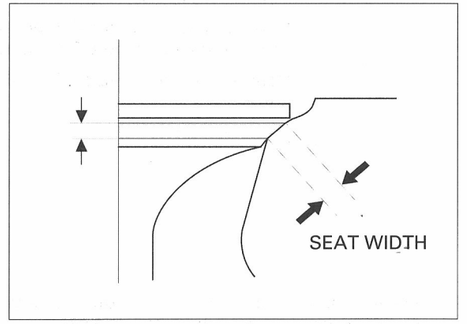


The valves cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

Remove the valve and inspect the valve seat face.
The valve seat contact should be within the specified width and even all around the circumference.

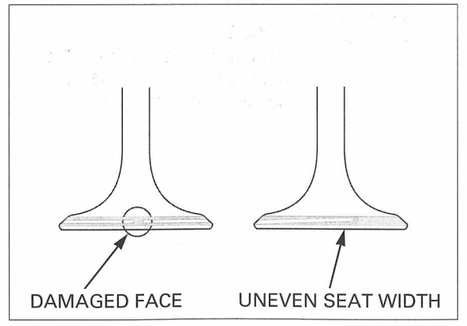
STANDARD: 0.8 mm (0.03 in)
SERVICE LIMIT: 1.3 mm (0.05 in)

If the valve seat width is not within specification, reface the valve seat (page 9-15).

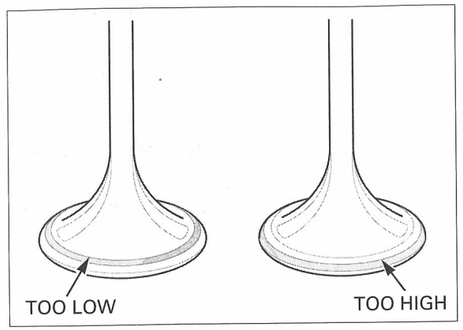


Inspect the valve seat face for:

- Damaged face:
  – Replace the valve and reface the valve seat
- Uneven seat width:
  – Bent or collapsed valve stem; Replace the valve and reface the valve seat



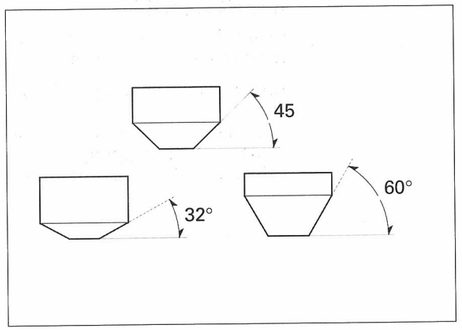
- Contact area (too low or too high area):
  – Reface the valve seat



REFACING

NOTE:

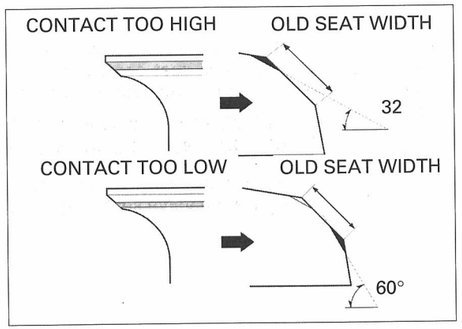
- Follow the refacing manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.



If the contact area is too high on the valve, the seat must be lowered using a 32° flat cutter.

If the contact area is too low on the valve, the seat must be raised using a 60° interior cutter.

Refinish the seat to specifications, using a 45° finish cutter.

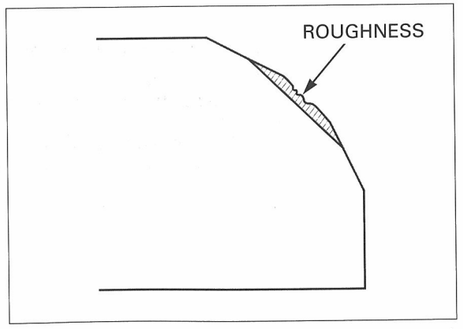


Reface the seat with a 45° cutter whenever a valve guide is replaced.

Use a 45° seat cutter, remove any roughness or irregularities from the seat.

TOOLS:

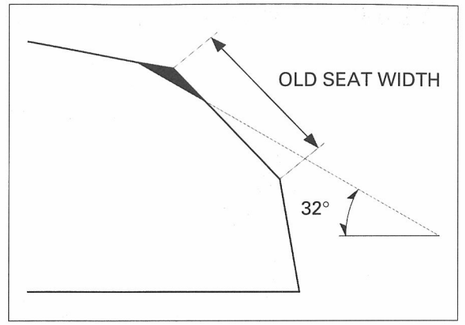
Seat cutter, 13 mm (45° EX)	**07VMH-GCR0300**
Seat cutter, 15 mm (45° IN)	**07VMH-GCR0100**
Cutter holder, 3.5 mm	**07HMH-KT70200 or equivalent commercially available**



Using a 32° flat cutter, remove 1/4 of the existing valve seat material.

TOOLS:

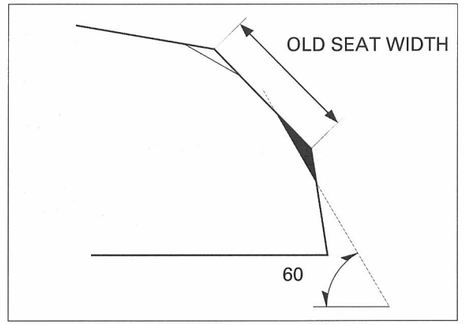
Flat cutter, 13 mm (32° EX)	**07VMH-GCR0400**
Flat cutter, 15 mm (32° IN)	**07VMH-GCR0200**
Cutter holder, 3.5 mm	**07HMH-KT70200 or equivalent commercially available**



Using a 60° interior cutter, remove 1/4 of the existing valve seat material.

TOOLS:

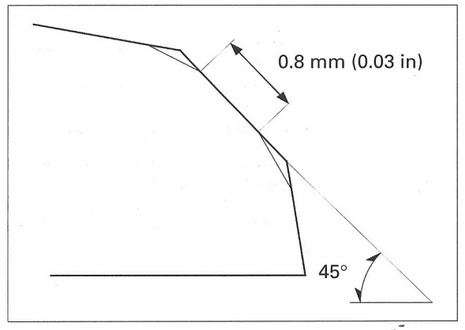
Interior cutter, 13 mm (60° EX)	**07VMH-GCR0500**
Interior cutter, 17 mm (60° IN)	**07780-0014600**
Cutter holder, 3.5 mm	**07HMH-KT70200 or equivalent commercially available**



Using a 45° seat cutter, cut the seat to the proper width.

VALVE SEAT WIDTH: 0.8 mm (0.03 in)

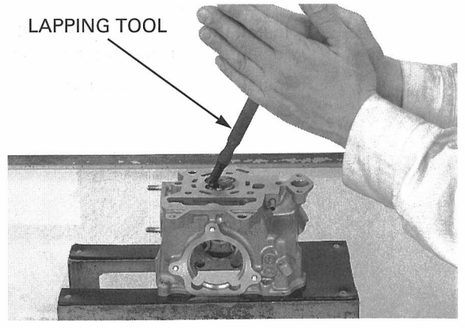
Make sure all pitting and irregularities are removed.



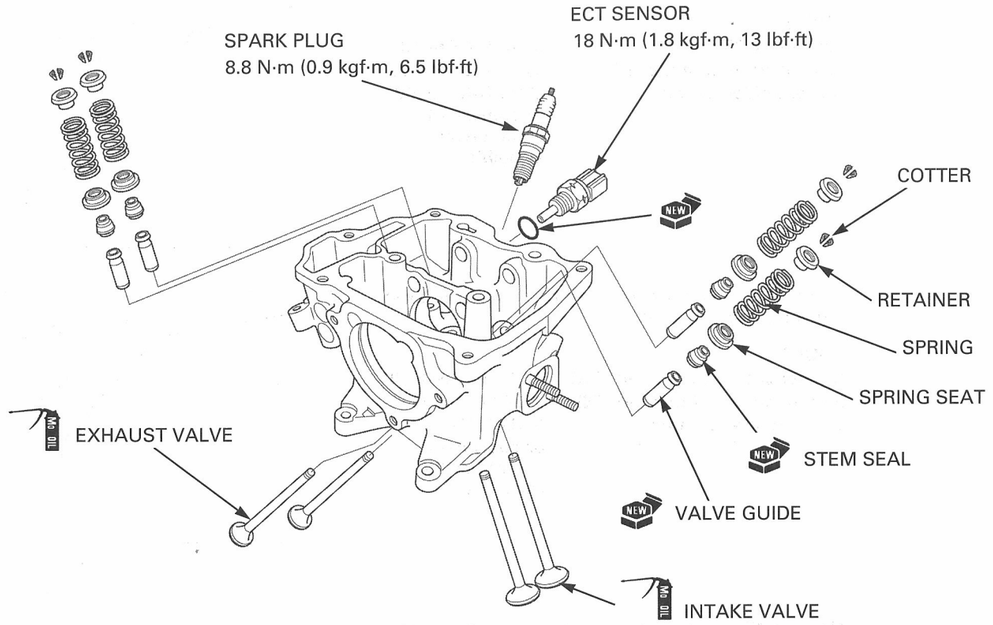
Excessive lapping pressure may deform or damage the seat, Do not allow lapping compound to enter the guides.

After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure.
Change the angle of the lapping tool frequently to prevent uneven seat wear,

After lapping, wash any residual compound off the cylinder head and valve and recheck the seat contact.

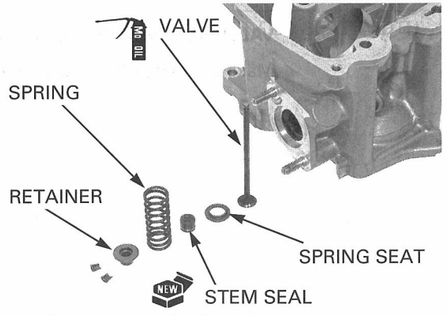


CYLINDER HEAD ASSEMBLY



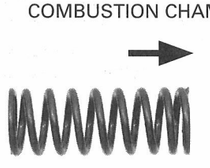
Blow through all oil passages in the cylinder head with compressed air.
Apply engine oil to the inner surface of new stem seals.
Install the spring seats and stem seals.

Lubricate the valve stem sliding surface with molybdenum oil solution.
Insert the valves into the guide while turning it slowly to avoid damage to the stem seals.



Install the valve springs with the tightly wound coils facing the combustion chamber.

Install the spring retainers.



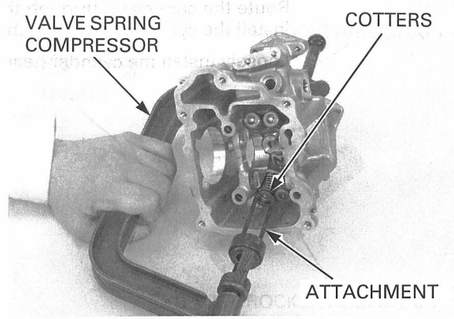
Grease the cotters to ease installation.

Install the valve spring cotters using the special tools.

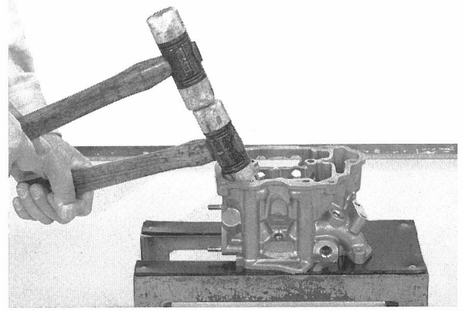
To prevent loss of tension, do not compress the valve spring more than necessary to remove the cotters.

TOOLS:

Valve spring compressor	**07757-0010000**
Valve spring compressor attachment	**070ME-MCW0100**



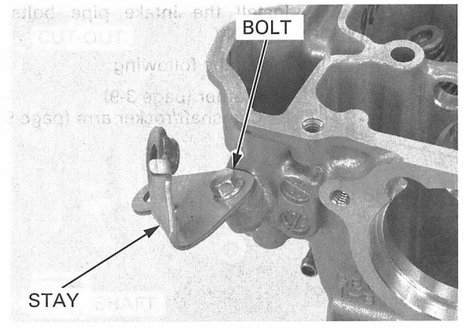
Support the cylinder head so the valve heads will not contact anything that cause damage.
Tap the valve stems gently with two plastic hammers as shown to seat the cotters firmly.



Install the stay and tighten the bolt securely.

Install the followings:

- Spark plug (page 4-6)
- ECT sensor (page 6-63)



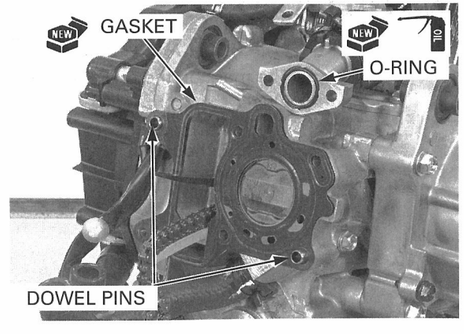
CYLINDER HEAD INSTALLATION

Clean the mating surface of the cylinder and cylinder head.

Install the cam chain, cam chain guide and tensioner (page 9-13).

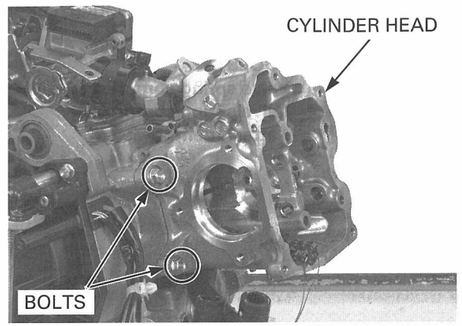
Install the dowel pins and a new gasket onto the cylinder.

Coat a new O-ring with oil and install it into the groove of the intake pipe.

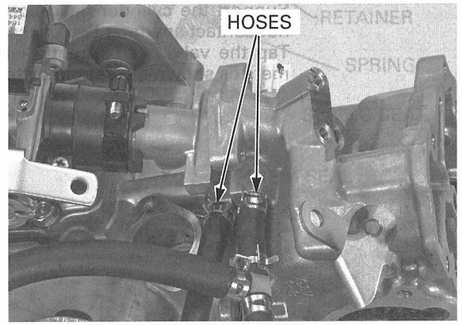


Route the cam chain through the cylinder head and install the cylinder head onto the cylinder.

Loosely install the cylinder head mounting bolts.



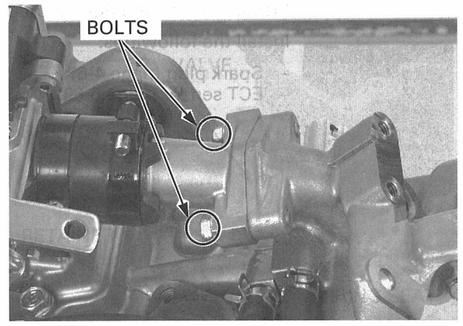
Connect the water hoses.



Install the intake pipe bolts and tighten them securely.

Install the following:

- Muffler (page 3-9)
- Camshaft/rocker arm (page 9-20)

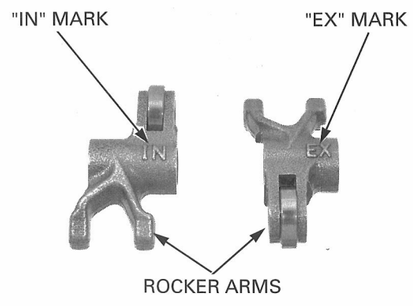


CAMSHAFT/ROCKER ARM INSTALLATION

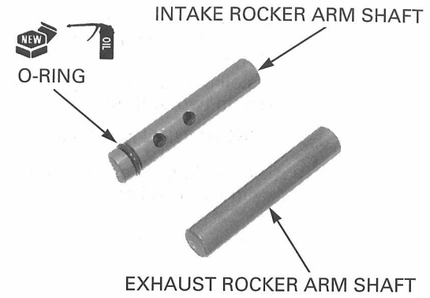
ROCKER ARM ASSEMBLY

The mark on the rocker arm have a following meanings:

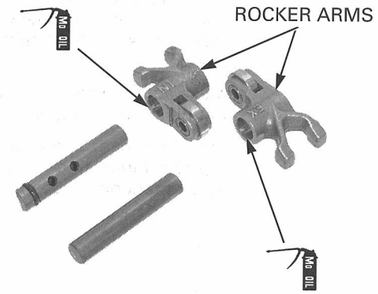
- IN: Intake rocker arm
- EX: Exhaust rocker arm



Intake rocker arm shaft has O-ring.
Replace the O-ring with a new one and apply oil it.



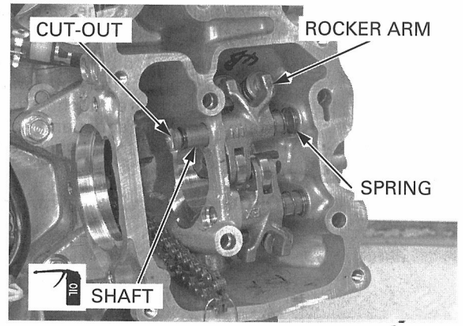
Apply molybdenum oil solution to the sliding and slipper surfaces of the rocker arms.



Install the rocker arms and side springs as shown.

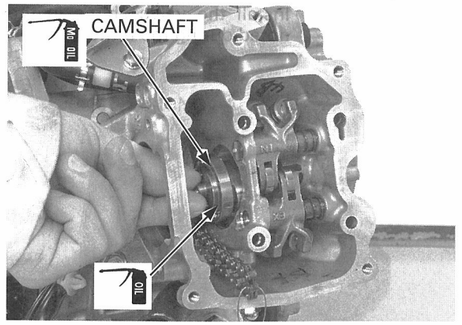
Install the intake shaft with the cut-out facing outside.

Apply engine oil to the sliding surfaces of the rocker arm shafts and install it to the cylinder head.



Apply oil to the camshaft bearings.
Apply molybdenum oil solution to the cam lobes.

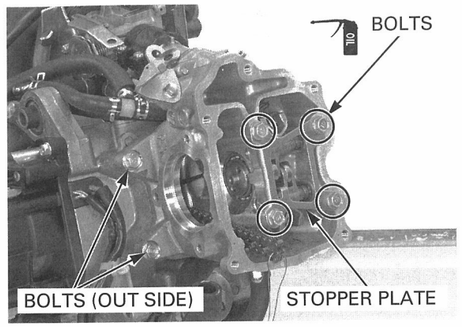
Install the camshaft with the cam lobe facing the cylinder side while pressing down the valve side of the rocker arms.



Apply engine oil to the cylinder head bolt threads and seating surfaces.
Install the stopper plate onto the cylinder head as shown.
Install the bolts and tighten them in a crisscross pattern in two or three steps to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

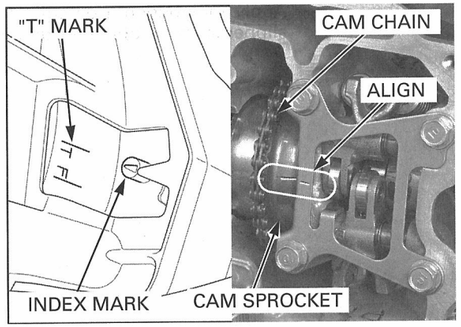
If the cylinder head is removed, tighten the outside cylinder head bolts.



Turn the drive pulley (crankshaft) counterclockwise and align the "T" mark on the flywheel with the index mark on the crankcase while holding the cam chain.

Make sure the cam lobe faces the cylinder side (TDC on the compression stroke).

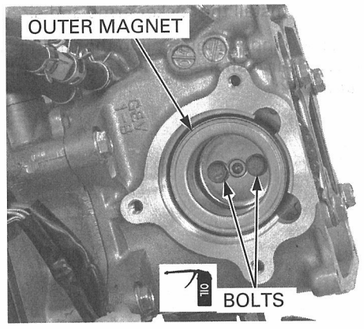
Install the cam sprocket onto the cam chain, aligning the index line on the cam sprocket with the index mark on the stopper plate.



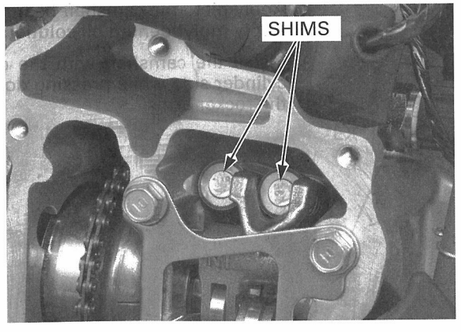
Apply engine oil to the cam sprocket bolt threads and seating surfaces.

Apply engine oil to the cam sprocket gear teeth.
Clean the inside of the outer magnet and check that no nuts or bolts are attached to the magnet.
Install the outer magnet and bolts.
Tighten the bolts to the specified torque while holding the crankshaft.

TORQUE: 8.8 N·m (0.9 kgf·m, 6.5 lbf·ft)



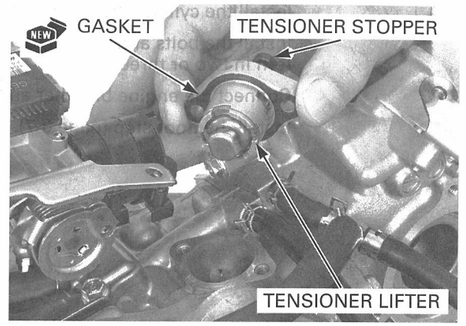
Install the valve shims in their original locations noted during the removal.



Turn the tensioner shaft clockwise with a special tool to hold the tensioner in the fully retracted position.

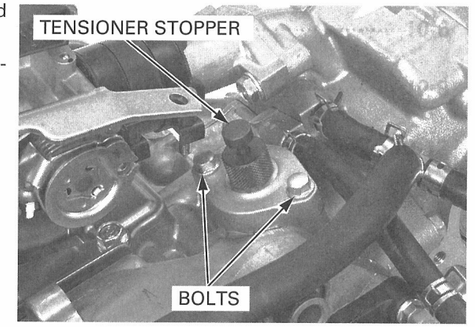
TOOL:
Cam chain tensioner stopper 070MG-0010100

Install a new gasket to the cam chain tensioner lifter.



Install the cam chain tensioner on the cylinder and tighten the bolts securely.

Remove a special tool to cancel the lock of the tensioner lifter.



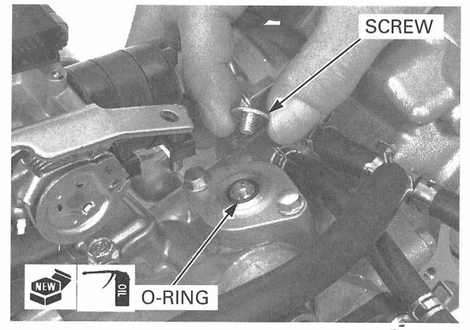
Coat a new O-ring with oil.
Install and tighten the lifter screw to the specified torque.

TORQUE: 4.2 N·m (0.43 kgf·m, 3.1 lbf·ft)

Make sure the index line on the cam sprocket aligns with the index mark on the stopper plate when the "T" mark on the flywheel is aligned with the index mark on the crankcase.

Install the following:

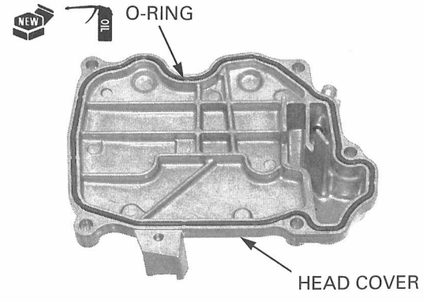
- Water pump (page 7-11)
- Fuel tank (page 6-52)
- Belt case cover (page 10-6)
- Cylinder head cover (page 9-23)



CYLINDER HEAD COVER INSTALLATION

Clean the gasket groove of the cylinder head cover.

Coat the new O-ring with oil and install it into the grooves of the cylinder head cover.

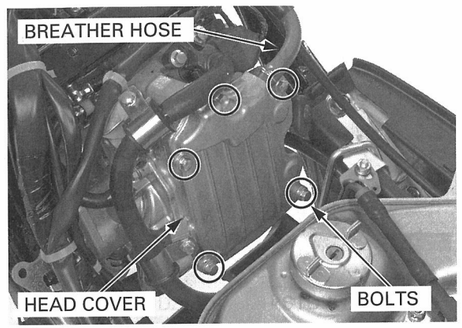


Install the cylinder head cover to the cylinder head.

Install the bolts and tighten them in a crisscross pattern in two or three steps.

Connect the engine breather and air supply hoses.

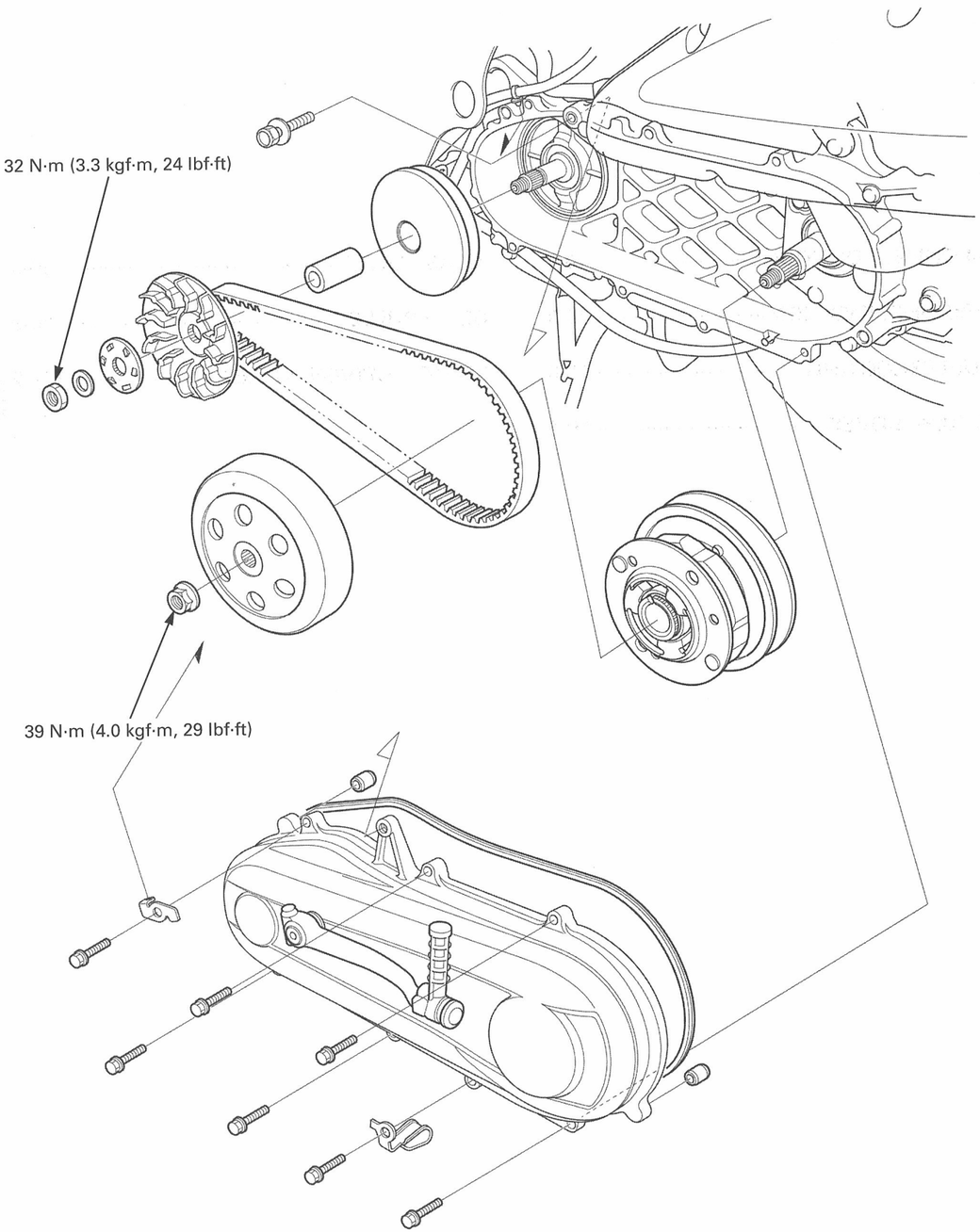
Install the floor step (page 3-7).



10. KICKSTARTER/DRIVE PULLEY/DRIVEN PULLEY/CLUTCH

COMPONENT LOCATIONS 10-2
SERVICE INFORMATION 10-3
TROUBLESHOOTING 10-5
BELT CASE COVER 10-6
KICKSTARTER 10-6
DRIVE PULLEY 10-9
CLUTCH/DRIVEN PULLEY 10-12

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- This section covers maintenance of the kickstarter, drive pulley, driven pulley and clutch.
- These services can be done with the engine installed in the frame.
- Avoid getting grease and oil on the V-belt and pulley drive faces in order to prevent belt slippage.
- Do not apply grease to the movable drive face and weight rollers.

SPECIFICATIONS

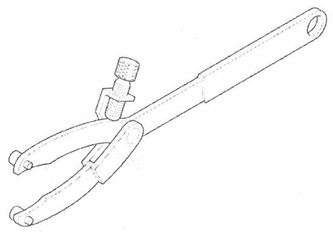
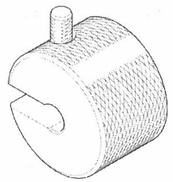
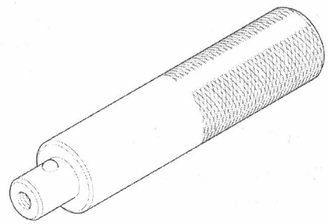
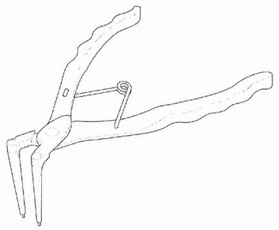
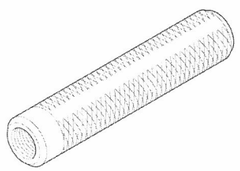
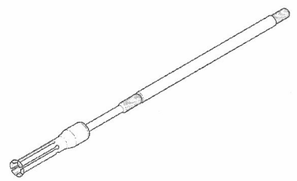
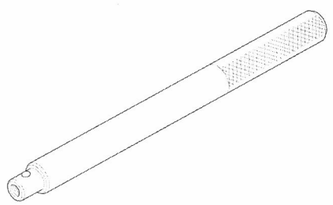
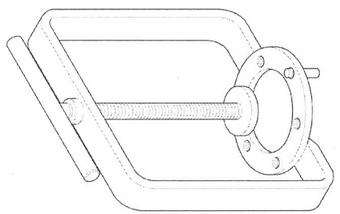
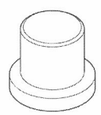
Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Clutch	Clutch outer I.D.	107.0 – 107.2 (4.21 – 4.22)	107.5 (4.23)
	Lining thickness	–	2.0 (0.08)
Drive belt width		18.15 (0.715)	17.15 (0.68)
Movable drive face	Bushing I.D.	20.035 – 20.085 (0.7888 – 0.7907)	20.13 (0.793)
	Boss O.D.	20.010 – 20.025 (0.7878 – 0.7884)	19.97 (0.786)
	Weight roller O.D.	15.92 – 16.08 (0.627 – 0.633)	15.4 (0.61)
Driven pulley	Face spring face length	85.78 (3.377)	81.5 (3.21)
	Driven face O.D.	33.930 – 33.980 (1.3358 – 1.3378)	33.70 (1.327)
	Movable driven face I.D.	34.015 – 34.035 (1.3392 – 1.3400)	34.29 (1.350)

TORQUE VALUES

Drive pulley face nut	32 N·m (3.3 kgf·m, 24 lbf·ft)	Apply oil to the threads and flange surface
Clutch outer nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	

TOOLS

Universal holder 07725-0030000 	Remover weight 07741-0010201 	Attachment, 22 x 24 mm 07746-0010800 
Pilot, 12 mm 07746-0040200 	Pilot, 17 mm 07746-0040400 	Driver 07749-0010000 
Snap ring pliers 07914-SA50001 	Remover handle 07936-3710100 	Bearing remover, 17 mm 07936-3710300 
Driver 07936-3710001 	Clutch spring compressor 07LME-GZ40201 	Puller attachment 07YMC-GCS0100 

TROUBLESHOOTING

Engine starts but scooter won't move
- Worn drive belt
- Damaged ramp plate
- Worn or damaged clutch shoe
- Broken driven face spring

Engine stalls or scooter creeps
- Broken clutch shoe spring

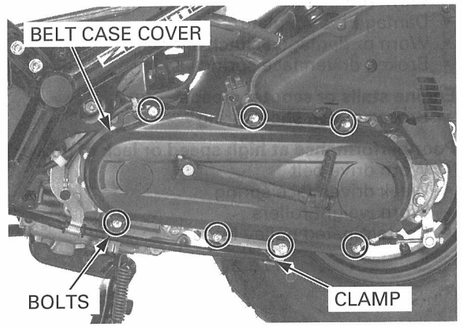
Poor performance at high speed or lack of power
- Worn drive belt
- Weak driven face spring
- Worn weight rollers
- Contaminated pulley faces

BELT CASE COVER

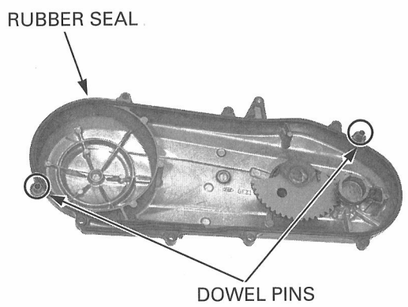
REMOVAL

Remove the air cleaner housing bolt (page 6-53).

Remove the bolts, clamp and belt case cover.



Remove the rubber seal and dowel pins from the belt case cover.



INSTALLATION

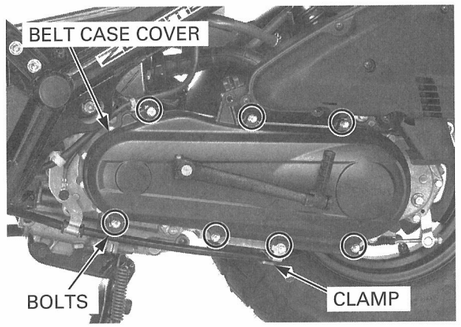
Check the rubber seal and replace it if necessary.
Clean the rubber seal groove of the belt case cover.

Install the dowel pins and the rubber seal to the belt case cover.

Install the belt case cover to the belt case by aligning the dowel pins with the holes.

Install and tighten the belt case cover bolts and clamp in a crisscross pattern in two or three steps.

Install the air cleaner housing bolt (page 6-53).

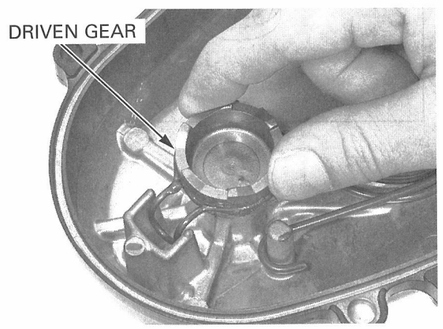


KICKSTARTER

DISASSEMBLY

Remove the belt case cover (page 10-6).

Remove the kickstarter driven gear by turning the kickstarter pedal clockwise.



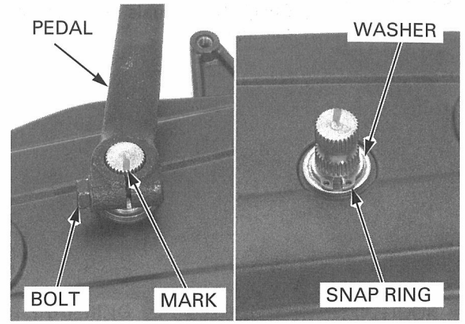
When disassembling the kickstarter, mark the pedal position to ensure correct reassembly in its original location.

Remove the bolt and kickstarter pedal.

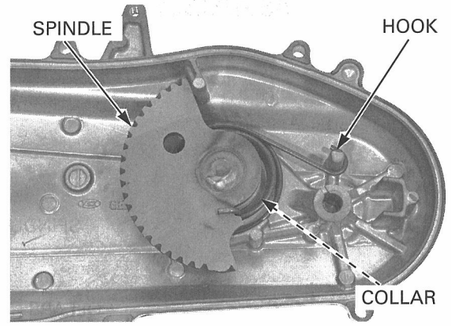
Release the hook end of the return spring from the belt case cover stopper.

Remove the snap ring and washer.

TOOL:
Snap ring pliers **07914-SA50001**

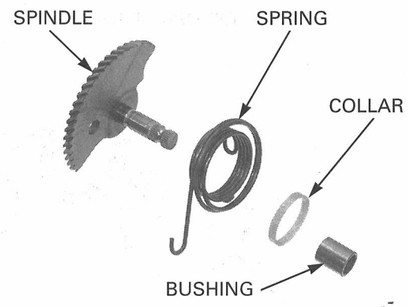


Remove the kickstarter spindle, return spring, collar and spindle bushing.

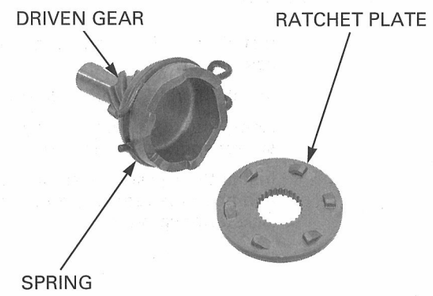


INSPECTION

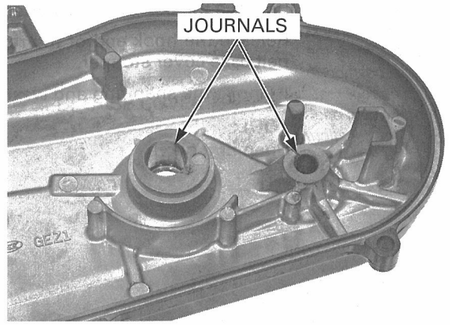
Check the kickstarter spindle and spindle gear for wear or damage.
Check the return spring for fatigue or damage.
Check the collar and bushing for wear or damage.



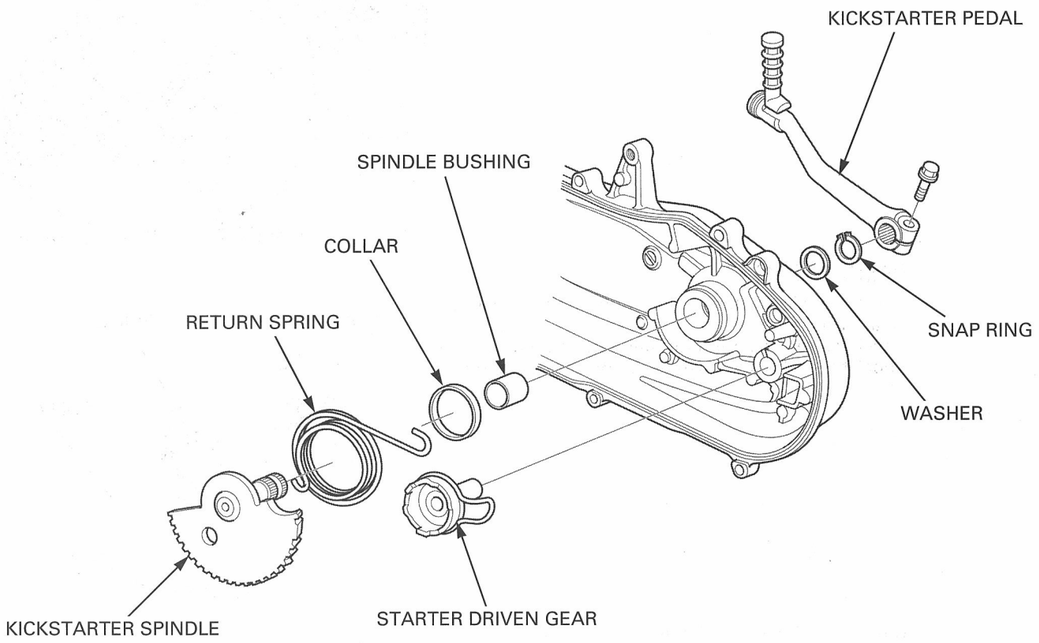
Check the kickstarter driven gear and ratchet plate for wear or damage.
Check the friction spring for fatigue or damage.



Check the journals of the belt case cover for wear or damage.



ASSEMBLY

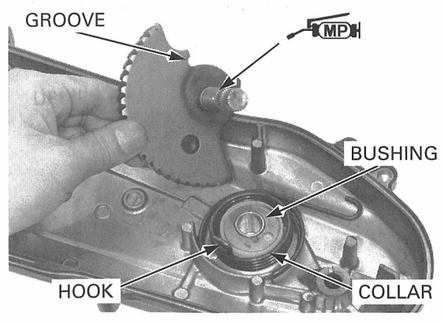


Install the spindle bushing and collar onto the belt case cover.

Install the return spring as shown.

Apply molybdenum paste 0.2 – 0.5 g to the kickstarter spindle sliding surface.

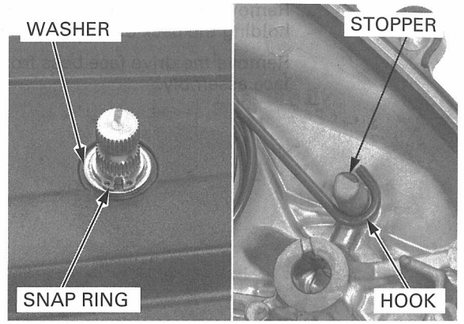
Install the kickstarter spindle to the belt case cover and hook the return spring end to the groove of the kickstarter spindle.



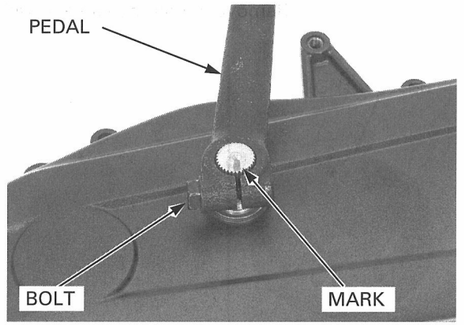
Install the thrust washer and snap ring in the groove of the spindle.

TOOL:
Snap ring pliers **07914-SA50001**

Hook the return spring end onto the stopper on the belt case cover.



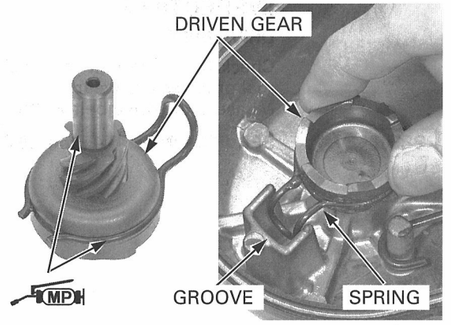
Install the kickstarter pedal to its original position as marked during removal.
Install and tighten the bolt securely.



Apply molybdenum paste to the kickstarter driven gear journal and spring surface.

Turn and hold the kickstarter pedal.
Install the kickstarter driven gear, aligning the spring end with the groove of the belt case cover and the kickstarter gear with the driven gear.

Install the belt case cover (page 10-6).



DRIVE PULLEY

REMOVAL

Remove the belt case cover (page 10-6).

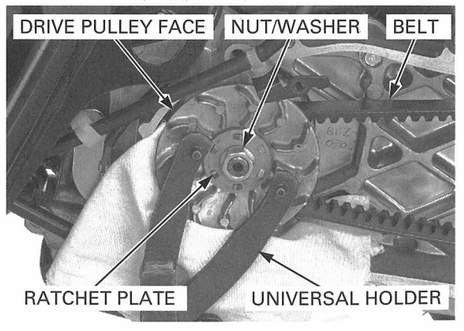
Be careful not to damage the belt case mating surface.

Hold the drive pulley face with special tool and loosen the drive pulley face nut.

TOOL:
Universal holder **07725-0030000**

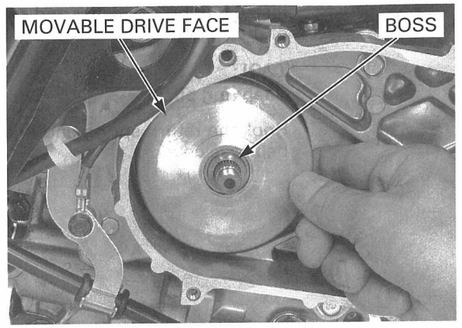
Remove the nut, washer, ratchet plate and drive pulley face.

Remove the drive belt from the crankshaft.

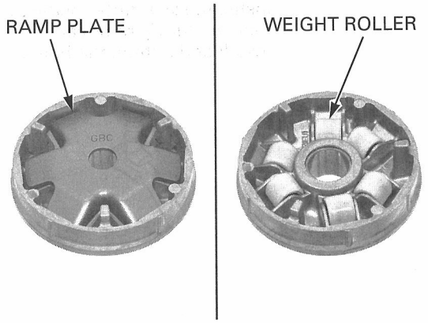


Remove the movable drive face assembly while holding the back of the ramp plate.

Remove the drive face boss from the movable drive face assembly.



Remove the ramp plate and weight rollers.

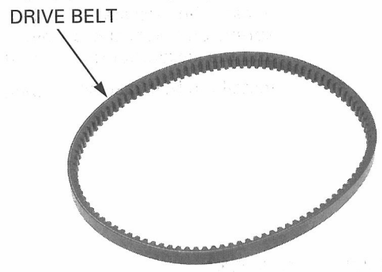


INSPECTION

DRIVE BELT

Check the drive belt for cracks, separation, abnormal or excessive wear.
Measure the drive belt width.

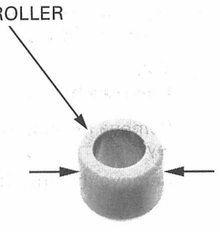
SERVICE LIMIT: 17.15 mm (0.68 in)



WEIGHT ROLLER

Check each roller for wear or damage.
Measure the weight roller O.D.

SERVICE LIMIT: 15.4 mm (0.61 in)



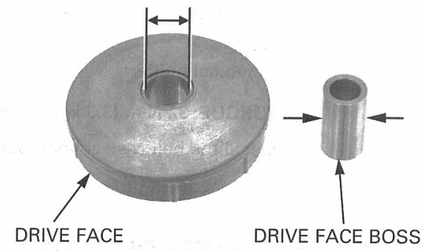
MOVABLE DRIVE FACE

Check the drive face boss for wear or damage.
Measure the boss O.D.

SERVICE LIMIT: 19.97 mm (0.786 in)

Measure the face bushing I.D.

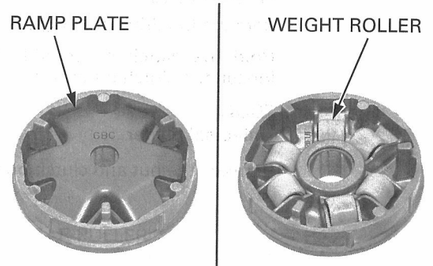
SERVICE LIMIT: 20.13 mm (0.793 in)



ASSEMBLY

Clean any oil and grease from the pulley faces and weight rollers.

Install the weight rollers on the movable drive face.
Install the ramp plate.



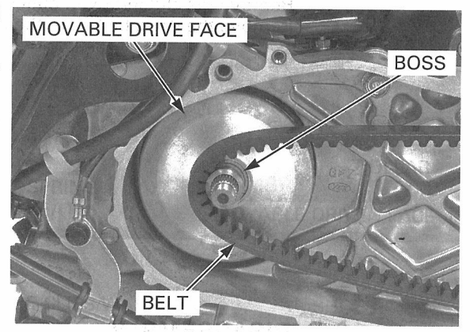
INSTALLATION

Clean any oil and grease from the pulley faces and the drive belt.

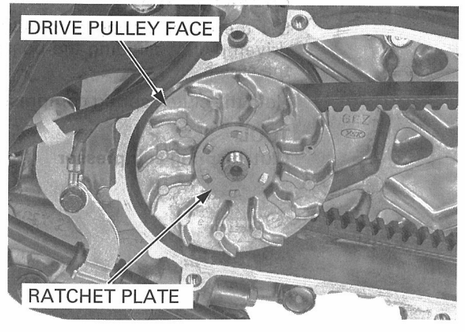
Install the drive face boss into the movable drive face assembly.

Install the movable drive face assembly onto the crankshaft while holding the ramp plate.

Install the drive belt onto the drive face boss.



Install the drive pulley face, ratchet plate.



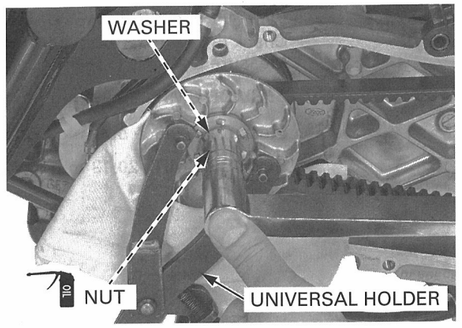
Install the washer.
Apply oil to the drive pulley face nut threads and seating surface, then install the nut.

Hold the drive pulley face with the special tool and tighten the nut to the specified torque.

TOOL:
Universal holder **07725-0030000**

TORQUE: 32 N·m (3.3 kgf·m, 24 lbf·ft)

Install the belt case cover (page 10-6).



CLUTCH/DRIVEN PULLEY

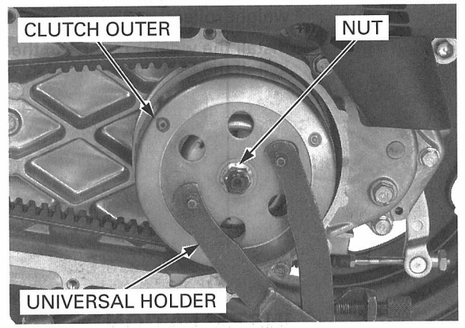
REMOVAL

Remove the drive pulley (page 10-9).

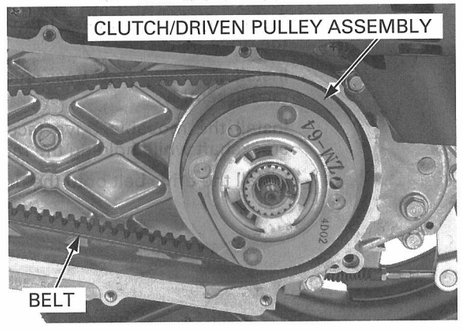
Hold the clutch outer with the special tool and loosen the clutch outer nut.

TOOL:
Universal holder **07725-0030000**

Remove the nut and clutch outer.



Remove the clutch/driven pulley assembly.
Remove the drive belt from the driven pulley.

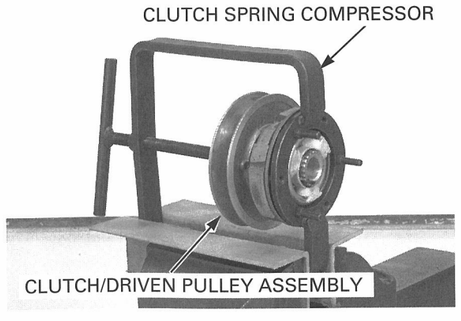


DISASSEMBLY

Set the clutch spring compressor onto the clutch/driven pulley, aligning the bosses with the holes in the clutch.

Hold the clutch spring compressor in a vise.

TOOL:
Clutch spring compressor **07LME-GZ40201**

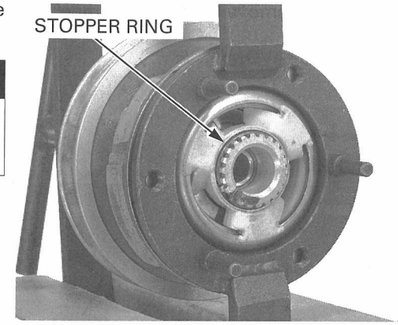


To prevent loss of tension, do not compress the clutch spring more than necessary to remove the stopper ring.

Compress the clutch/driven pulley and remove the stopper ring.

⚠CAUTION

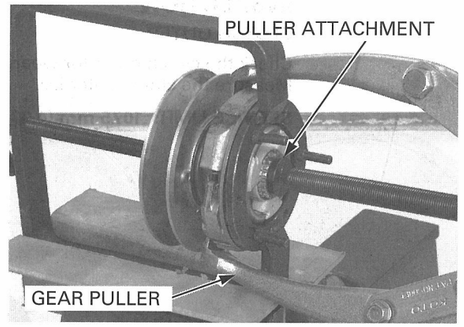
Do not remove the special tool when the stopper ring is removed. If so, some parts may pop out.



Install the gear puller or equivalent tool and special tool as shown.

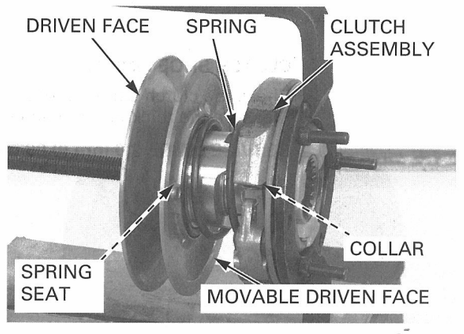
TOOL:
Puller attachment **07YMC-GCS0100**

Loosen the clutch spring compressor gradually and tighten the gear puller gradually.
Repeat this procedure and remove the clutch assembly from the driven face.



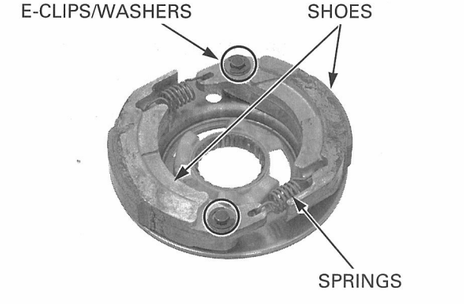
Remove the following:

- Clutch assembly
- Spring collar
- Driven face spring
- Spring seat
- Movable driven face
- Driven face

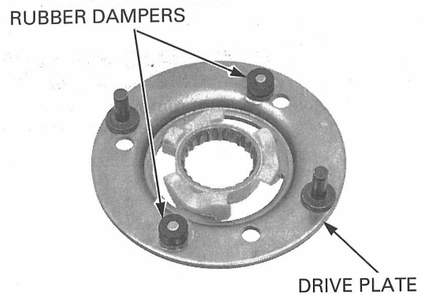


CLUTCH DISASSEMBLY

Remove the E-clips and washers.
Remove the clutch shoes and shoe springs.



Remove the rubber dampers from the drive plate.

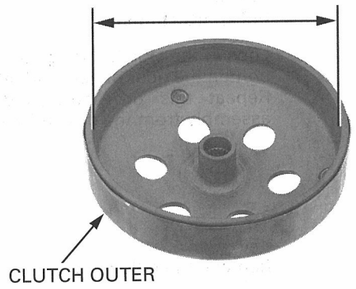


INSPECTION

CLUTCH OUTER

Check the clutch outer for wear or damage.
Measure the clutch outer I.D.

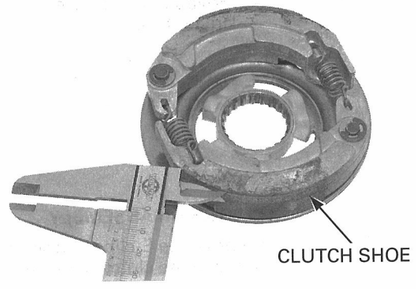
SERVICE LIMIT: 107.5 mm (4.23 in)



CLUTCH SHOE LINING

Check the clutch shoe for wear or damage.
Measure the thickness of each shoe.

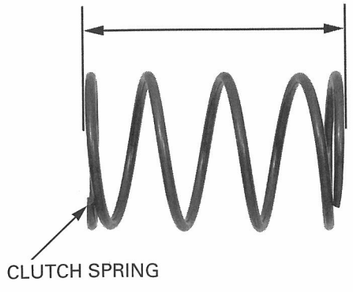
SERVICE LIMIT: 2.0 mm (0.08 in)



DRIVEN FACE SPRING

Measure the driven face spring free length.

SERVICE LIMIT: 81.5 mm (3.21 in)



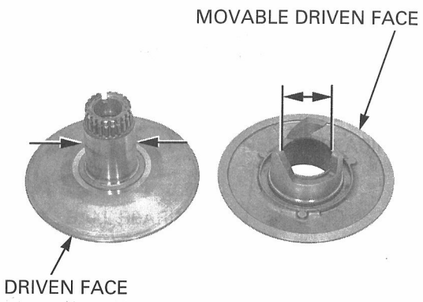
DRIVEN FACE/MOVABLE DRIVEN FACE

Check the driven face for scratches, scoring or damage.
Measure the driven face boss O.D.

SERVICE LIMIT: 33.70 mm (1.327 in)

Check the movable driven face for scratches, scoring or damage.
Check the guide grooves for stepped wear or damage.
Measure the movable driven face I.D.

SERVICE LIMIT: 34.29 mm (1.350 in)



DRIVEN FACE BEARING REPLACEMENT

Remove the snap ring using the special tool.

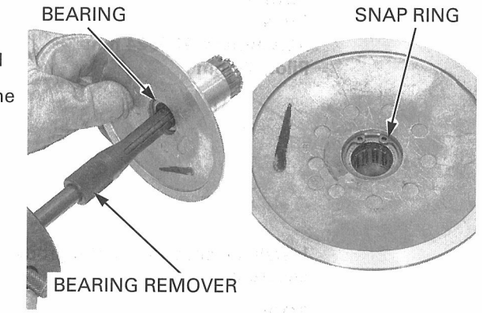
TOOL:

Snap ring pliers	**07914-SA50001**

Remove the driven face needle bearing using the special tools.

TOOL:

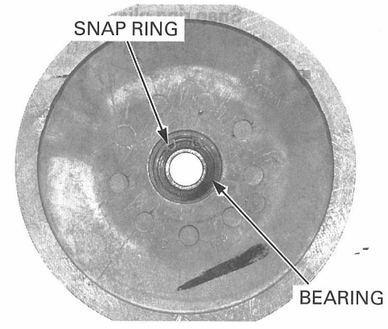
Bearing remover, 17 mm	**07936-3710300**
Remover handle	**07936-3710100**
Remover weight	**07741-0010201**



Remove the snap ring, then remove the ball bearing.

TOOL:

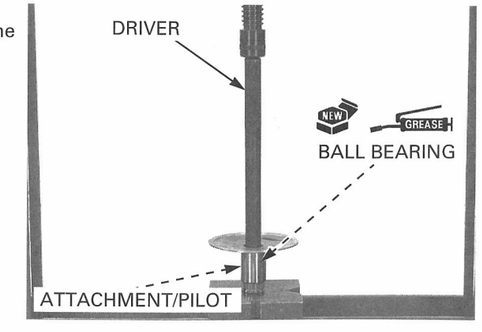
Snap ring pliers	**07914-SA50001**



Apply grease to a new ball bearing.
Press the ball bearing into the driven face with the marked side facing up.

TOOLS:

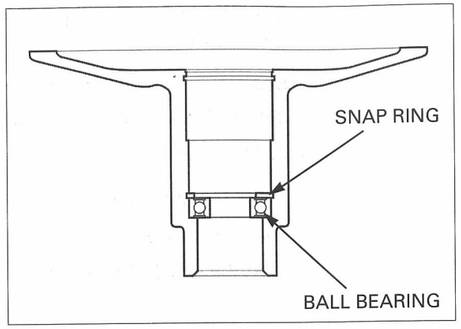
Driver	**07949-3710001**
Attachment, 22 X 24 mm	**07746-0010800**
Pilot, 12 mm	**07746-0040200**



Install the snap ring to the groove in the driven face securely.

TOOL:

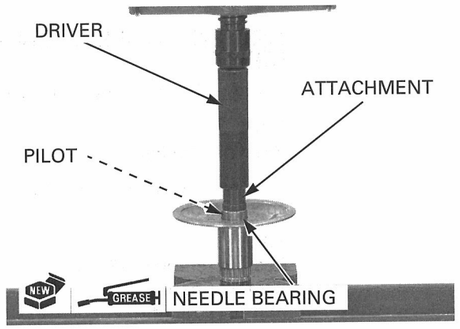
Snap ring pliers	**07914-SA50001**



Apply grease to a new needle bearing.
Press the needle bearing into the driven face with the marked side facing up.

TOOLS:

Driver	**07749-0010000**
Attachment, 22 X 24 mm	**07746-0010800**
Pilot, 17 mm	**07746-0040400**



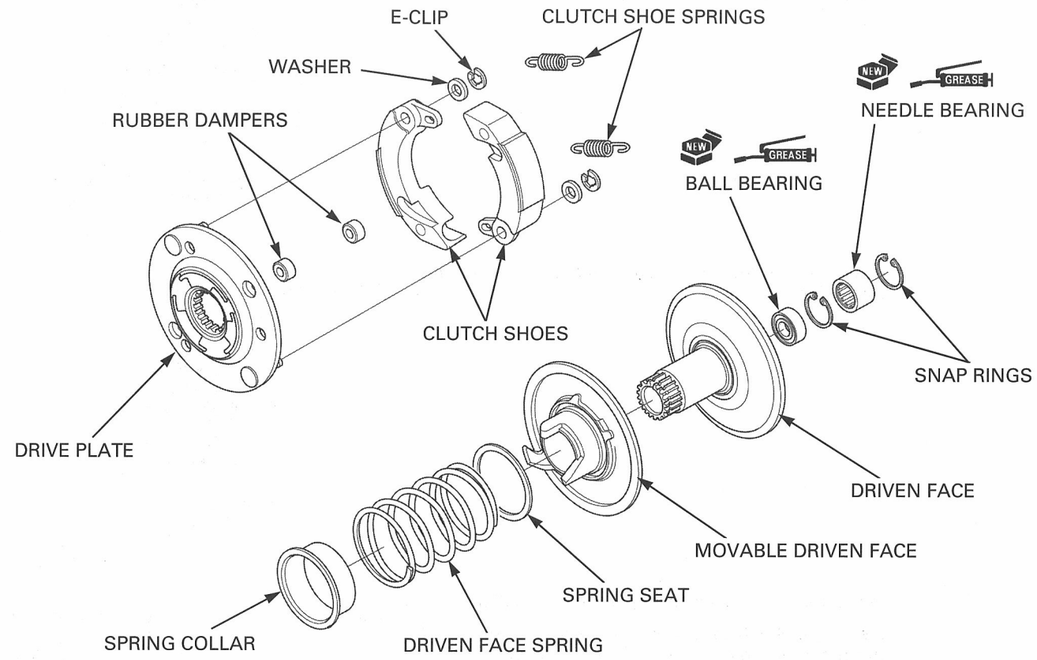
Install the snap ring to the groove of the driven face securely.

TOOL:

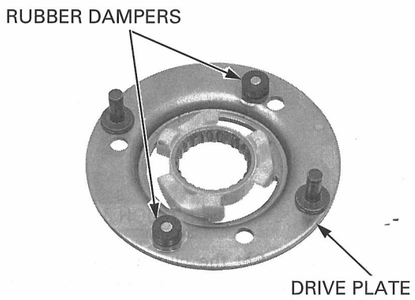
Snap ring pliers	**07914-SA50001**

ASSEMBLY

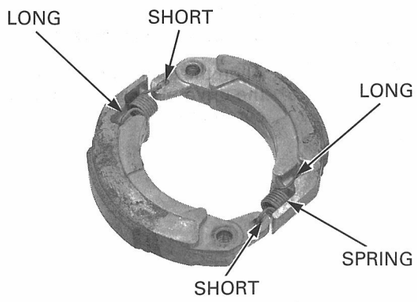
Clean any oil and grease from the pulley faces and clutch outer.



Install the rubber dampers onto the drive plate.

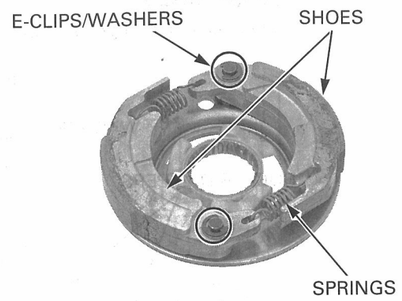


Install the shoe springs into the clutch shoes as shown.

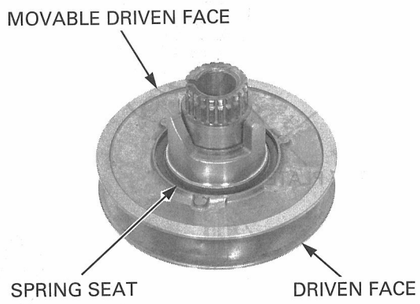


Install the clutch shoes assembly into the drive plate.

Install the washers and E-clips.

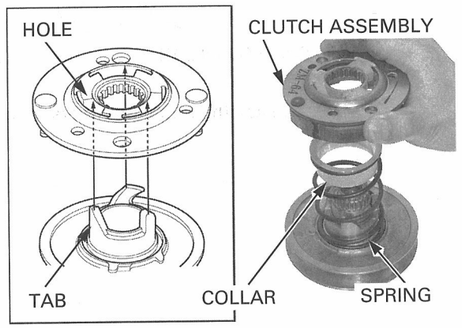


Assemble the movable driven face, spring seat and driven face.



Install the driven face spring and spring collar.

Install the clutch assembly while aligning the tab of the movable driven face with the hole of the drive plate.

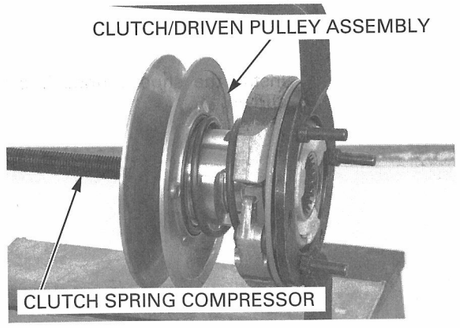


To prevent loss of tension, do not compress the clutch spring more than necessary to install the stopper ring. Be careful not to damage the spline.

Set the clutch spring compressor over the clutch/driven pulley assembly and compress the driven face spring.

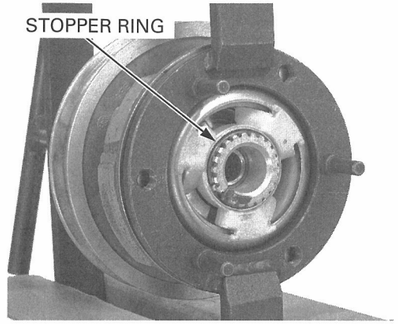
TOOL:
Clutch spring compressor **07LME-GZ40201**

Align the spline of the driven face with the spline of the drive plate while compressing the clutch spring compressor.



Install the stopper ring securely.

Remove the clutch/driven pulley assembly from the spring compressor.

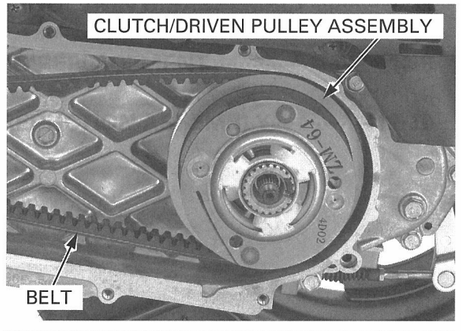


INSTALLATION

Rotate the movable driven face clockwise and install the drive belt into the driven pulley.

Do not get any oil and grease on the driven face inside.

Install the clutch/driven pulley assembly onto the driveshaft.



Clean any oil and grease from the inside of the clutch outer.

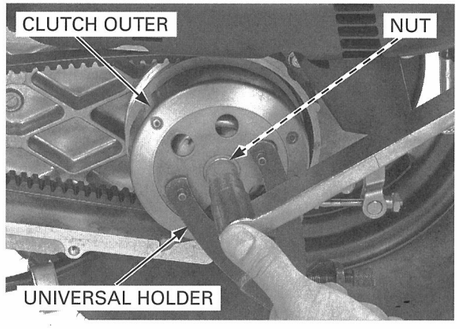
Install the clutch outer and clutch outer nut.

Hold the clutch outer with the special tool and tighten the clutch outer nut to the specified torque.

TOOL:
Universal holder **07725-0030000**

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

Install the drive pulley (page 10-11).



MEMO

11. FINAL REDUCTION

COMPONENT LOCATIONS 11-2

SERVICE INFORMATION 11-3

TROUBLESHOOTING 11-4

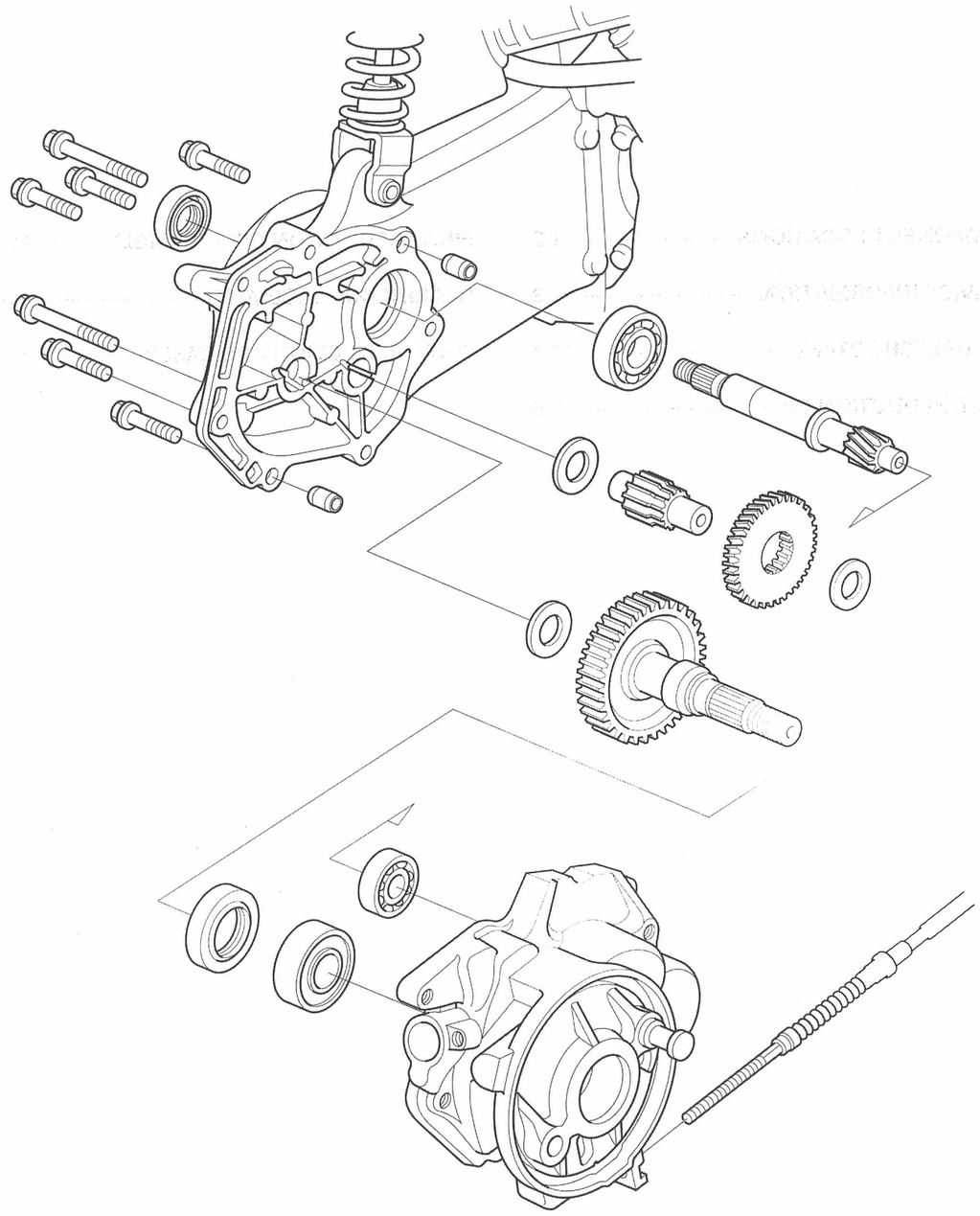
FINAL REDUCTION OIL 11-5

FINAL REDUCTION DISASSEMBLY 11-5

BEARING REPLACEMENT 11-9

FINAL REDUCTION ASSEMBLY 11-10

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- This section covers maintenance of the final reduction.
- These services can be done with the engine installed in the frame.
- When installing the drive shaft, be sure to use the special tool; position the special tool against the bearing inner race and pull the drive shaft into the bearing.

SPECIFICATIONS

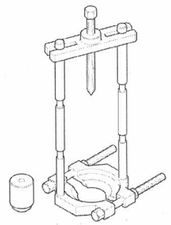
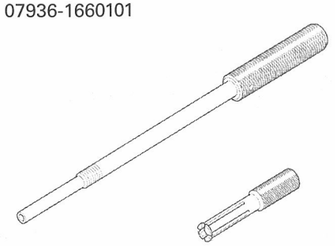
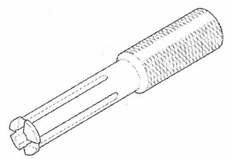
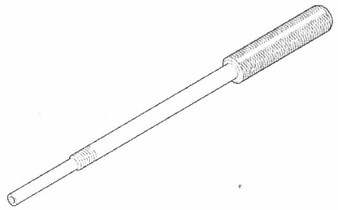
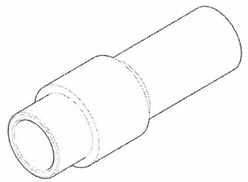
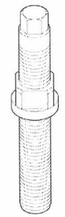
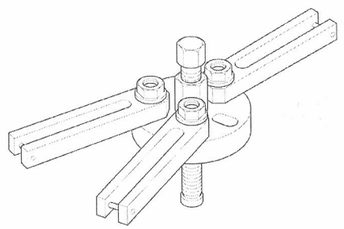
ITEM	SPECIFICATIONS
Final reduction oil capacity (at disassembly)	0.1 liter (0.11 US qt, 0.09 Imp qt)
Recommended final reduction oil	Hypoid gear oil #90

TORQUE VALUES

Final reduction oil check bolt	13 N·m (1.3 kgf·m, 9 lbf·ft)

TOOLS

Bearing remover weight 07741-0010201	Attachment, 32 x 35 mm 07746-0010100	Attachment, 37 x 40 mm 07746-0010200
Pilot, 12 mm 07746-0040200	Pilot, 17 mm 07746-0040400	Driver 07749-0010000

Universal bearing puller 07931-4630000  or equivalent commercially available	Bearing remover set, 12 mm 07936-1660101 	Bearing remover head, 12 mm 07936-1660110 
Bearing remover shaft 07936-1660120 	Assembly collar 07965-GM00100 	Assembly shaft 07965-GM00300 
Case puller 07SMC-0010001 		

TROUBLESHOOTING

Engine does start but scooter won't move
- Damaged transmission
- Seized transmission
- Faulty drive and driven pulleys/clutch (page 10-3)

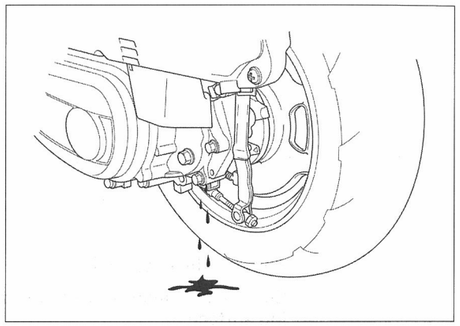
Abnormal noise
- Worn, seized or chipped gears
- Worn or damaged transmission bearing

Oil leak
- Oil level too high
- Worn or damaged oil seal

FINAL REDUCTION OIL

LEVEL CHECK

Make sure the final reduction case has no oil leaks.



Support the scooter with its center stand on a level surface.

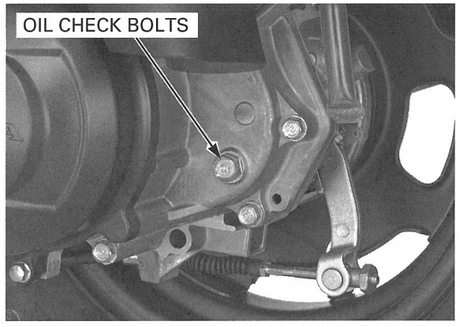
Warm up the engine to normal operating temperature.
Remove the final reduction oil check bolt and check whether the oil flows out from the check bolt hole.

If the level is low (oil does not flow out), add the recommended oil.

RECOMMENDED FINAL REDUCTION OIL:
Hypoid gear oil #90

Install the final reduction oil check bolt with a new sealing washer and tighten it to the specified torque.

TORQUE: 13 N·m (1.3 kgf·m, 9 lbf·ft)



FINAL REDUCTION DISASSEMBLY

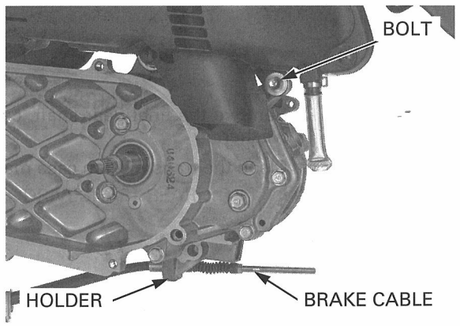
TRANSMISSION DISASSEMBLY

Remove the following:

- Clutch/driven pulley (page 10-12)
- Rear wheel (page 15-4)
- Rear brake (page 15-5)

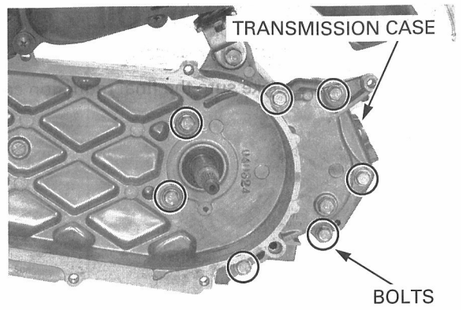
Remove the air cleaner housing bolts.

Remove the brake cable from the cable holder.



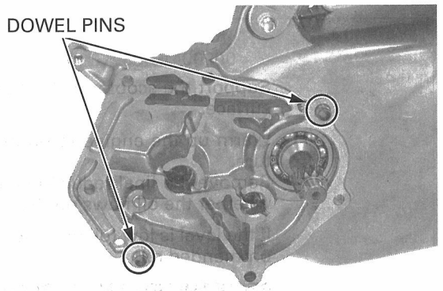
Remove the seven bolts and hose clamp.

Remove the transmission case and drain all oil to the suitable container from the transmission case.

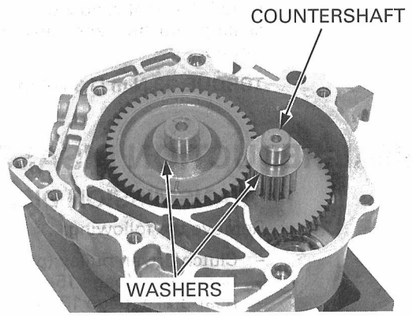


Remove the dowel pins.

Clean any sealant from the transmission case mating surface.

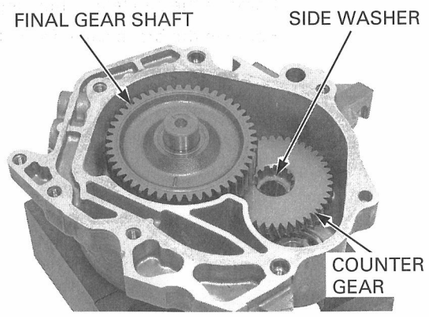


Remove the thrust washers and countershaft.



Remove the final gear shaft, counter gear and side washer.

Clean the transmission case mating surface.

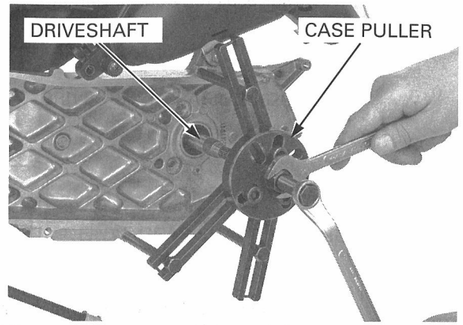


DRIVESHAFT REMOVAL

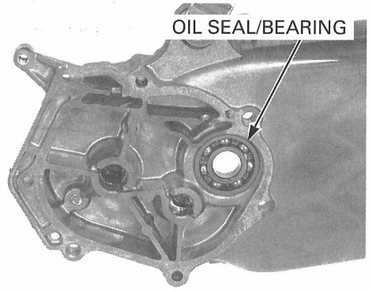
Remove the driveshaft using the special tool.

TOOL:

Case puller	**07SMC-0010001**



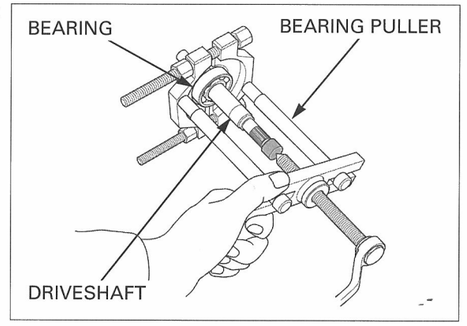
Remove the driveshaft oil seal and bearing.



If the bearing is left on the driveshaft, remove it using the special tool.

TOOL:

Universal bearing puller	**07931-4630000 or equivalent commercially available**

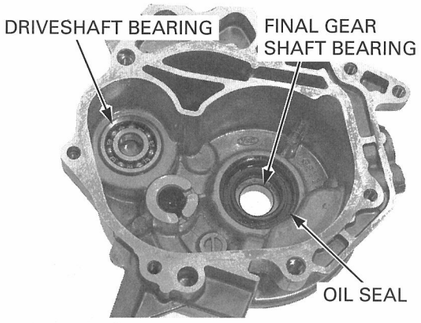


INSPECTION

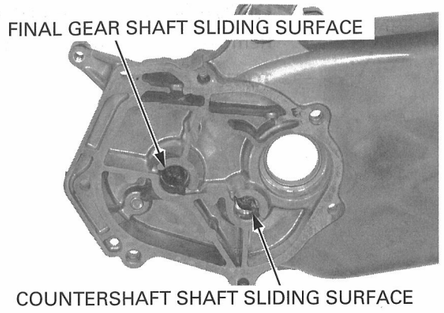
Remove the oil seal.

Turn the inner race of each bearing with your finger. The bearings should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the case.

Remove and discard the bearing if the races do not turn smoothly and quietly, or if they fit loosely in the case.

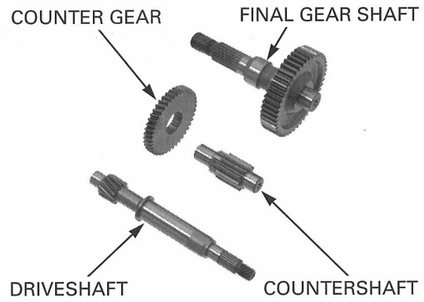


Check the countershaft and final gear shaft sliding surfaces for wear or damage.

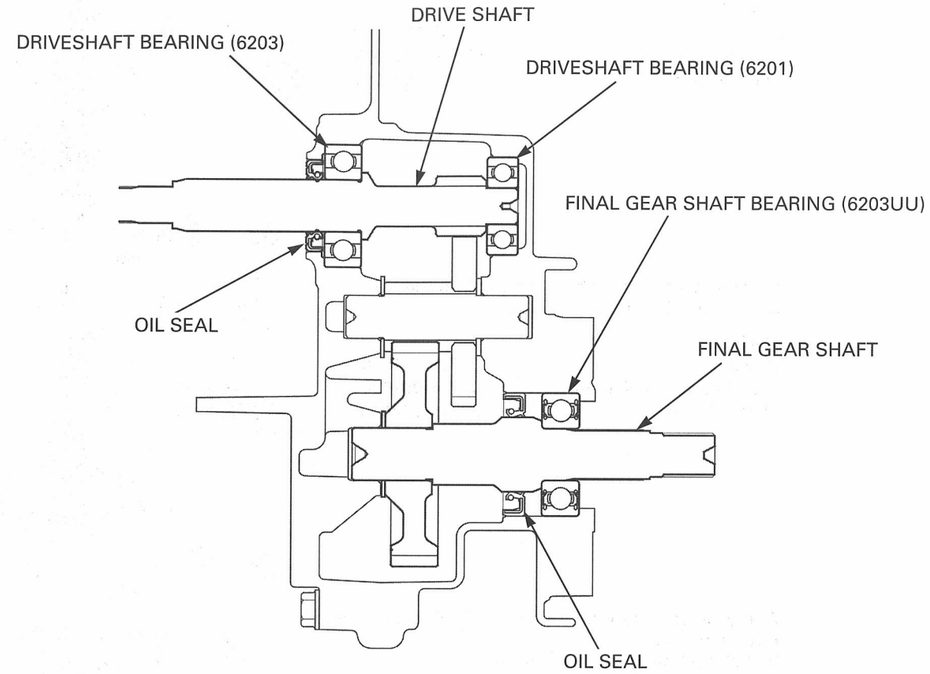


Check the driveshaft, final gear shaft, countershaft and counter gear for wear or damage.

Coat each gear teeth with oil.

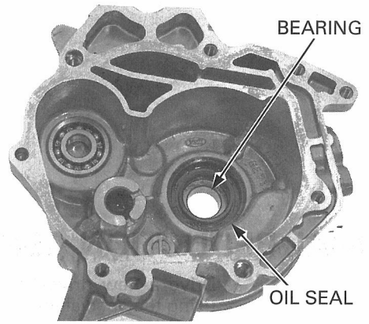


BEARING REPLACEMENT



Be careful not to damage the transmission case mating surface.

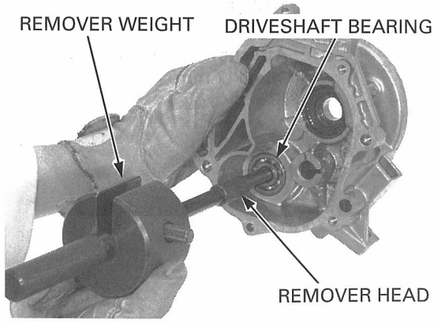
Remove the final gear shaft oil seal and bearing.



Remove the driveshaft bearing using the special tools.

TOOLS:

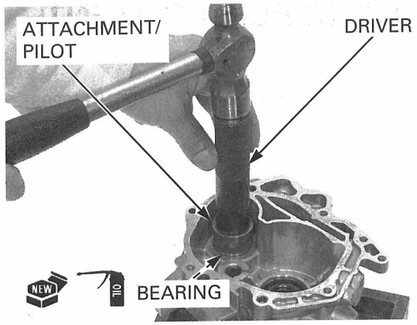
Bearing remover set, 12 mm	**07936-1660101**
– Bearing remover head, 12 mm	**07936-1660110**
– Bearing remover shaft	**07936-1660120**
– Remover weight	**07741-0010201**



Drive new driveshaft bearing into the transmission case using the special tool.

TOOLS:

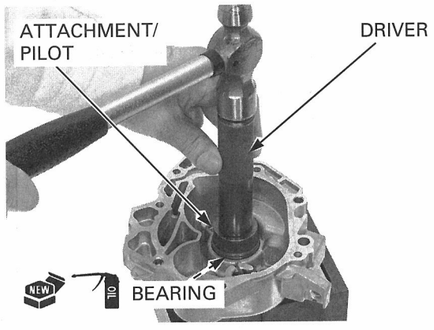
Driver	**07749-0010000**
Attachment, 32 X 35 mm	**07746-0010100**
Pilot, 12 mm	**07746-0040200**



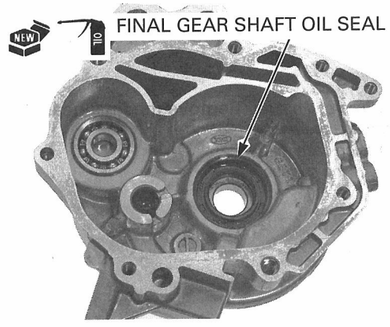
Drive new final gear shaft bearing into the transmission case using the special tool.

TOOLS:

Driver	**07749-0010000**
Attachment, 37 X 40 mm	**07746-0010200**
Pilot, 17 mm	**07746-0040400**



Apply oil to a new final gear shaft oil seal lip and outer surface.
Install the final gear shaft oil seal.

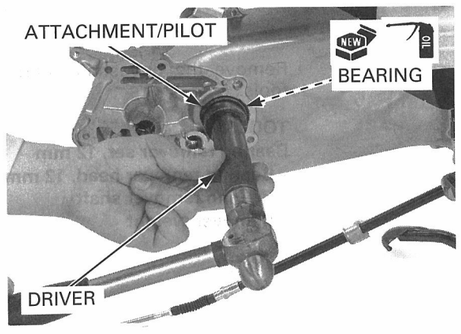


FINAL REDUCTION ASSEMBLY

Drive a new driveshaft bearing into the belt case using the special tools.

TOOLS:

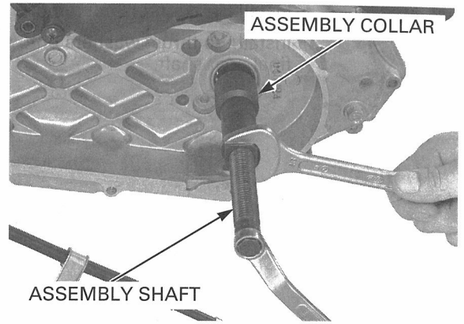
Driver	**07749-0010000**
Attachment, 37 X 40 mm	**07746-0010200**
Pilot, 17 mm	**07746-0040400**



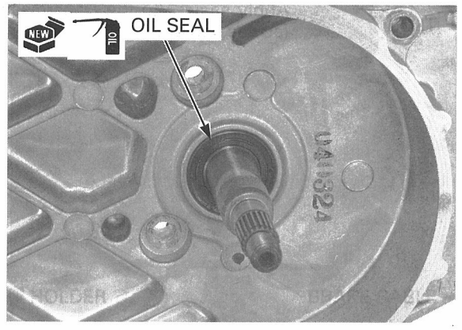
Install the drive shaft into the belt case.
Position the assembly collar against the driveshaft bearing inner race.
Thread the assembly shaft onto the driveshaft.
Hold the assembly shaft and draw the driveshaft into the bearing inner race by turning the nut.

TOOLS:

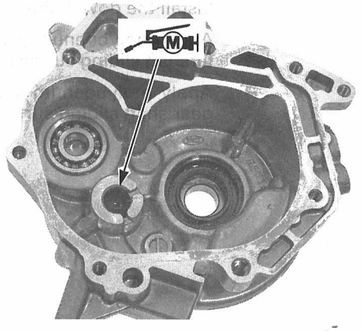
Assembly shaft	**07965-GM00300**
Assembly collar	**07965-GM00100**



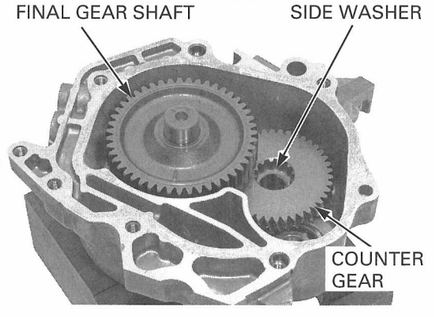
Apply oil to a new driveshaft oil seal lip and outer surface.
Install the driveshaft oil seal.



Apply molybdenum grease 0.5 – 1.0 g to the countershaft sliding surface.

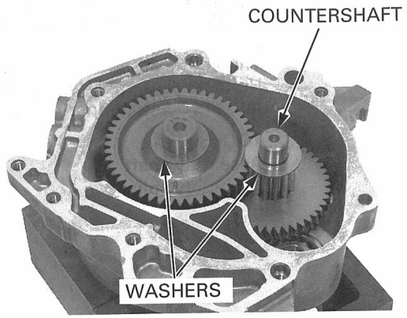


Install the side washer, counter gear and final gear shaft into the transmission case.

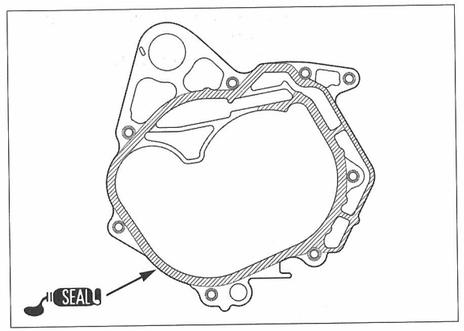


Install the countershaft into the transmission case.

Install the thrust washers onto the countershaft and final gear shaft.



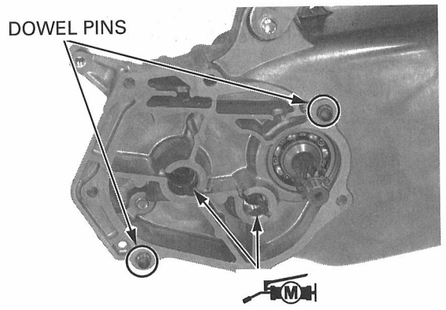
Apply sealant to the transmission case mating surface as shown.



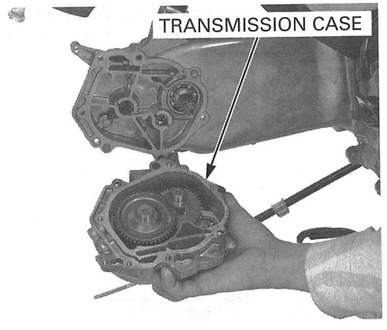
Install the dowel pins.

Apply molybdenum grease 0.5 – 1.0 g to the countershaft sliding surface.

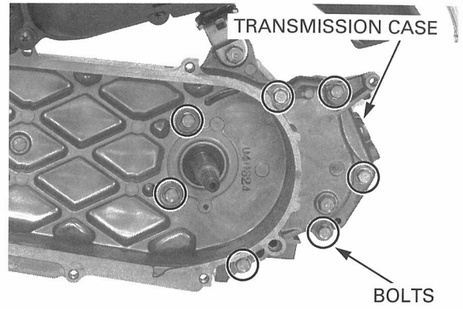
Apply molybdenum grease 0.3 – 0.5 g to the final gear shaft sliding surface.



Install the transmission case.



Install the clamp, bolts and tighten them in a criss-cross pattern in two or three steps.

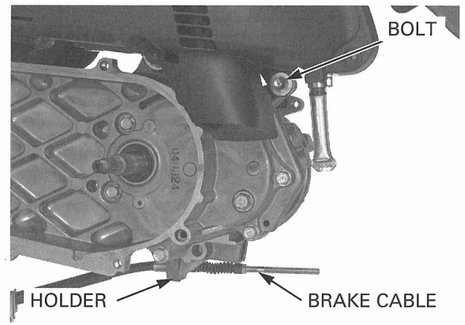


Install the air cleaner housing and tighten the bolt securely.
Install the brake cable through the cable holder.

Install the following:

- Rear brake (page 15-6)
- Rear wheel (page 15-4)
- Clutch/driven pulley (page 10-19)

Fill the final reduction with the recommended final reduction oil (page 11-5).



MEMO

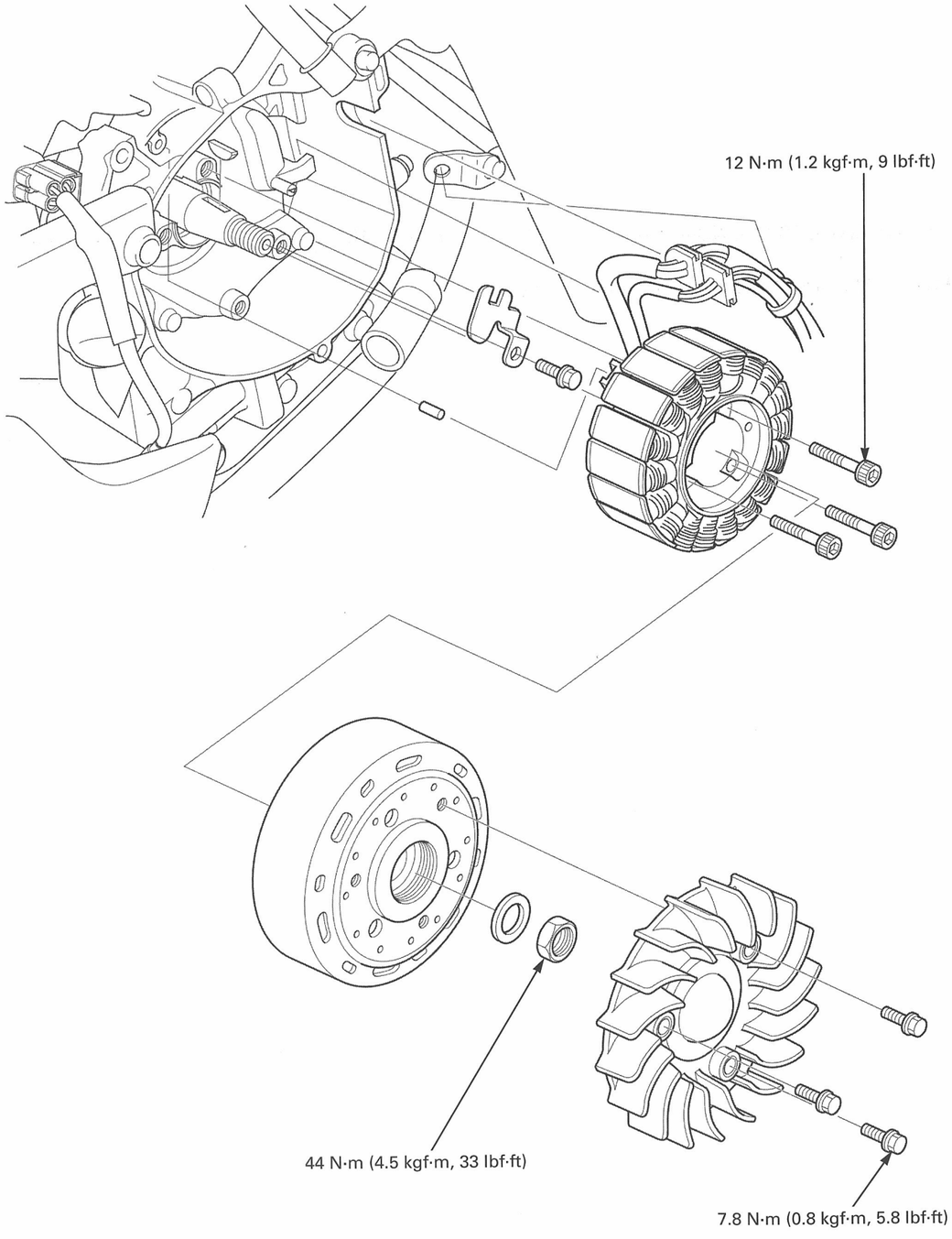
12. ALTERNATOR/STARTER

COMPONENT LOCATIONS 12-2

SERVICE INFORMATION 12-3

ALTERNATOR/STARTER 12-4

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- Always turn the ignition switch to "OFF" before servicing the alternator/starter. The alternator/starter could suddenly start when the ignition switch is turned to "ON", causing serious injury.
- This section covers the removal and installation of the flywheel, alternator/starter and CKP sensor.
- These services can be done with the engine installed in the frame.
- Refer to page 16-9 for alternator/starter inspection.

TORQUE VALUES

Flywheel nut	44 N·m (4.5 kgf·m, 33 lbf·ft)
Stator bolts	12 N·m (1.2 kgf·m, 9 lbf·ft)
Radiator cooling fan bolt	7.8 N·m (0.8 kgf·m, 5.8 lbf·ft)

TOOLS

Universal holder 07725-0030000	Flywheel puller 07733-0010000

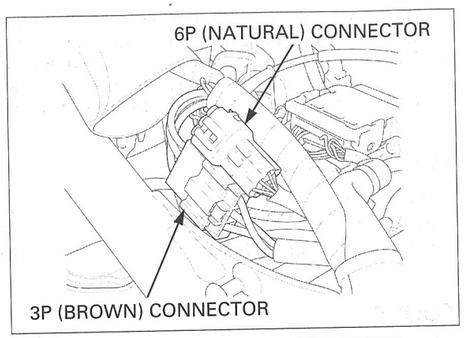
ALTERNATOR/STARTER

REMOVAL

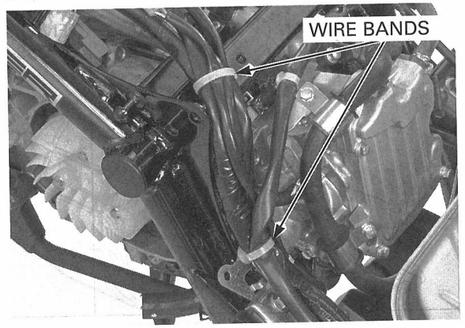
Remove the following:

- Floor step (page 3-7)
- Radiator (page 7-13)

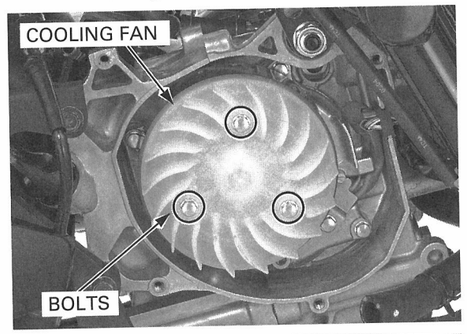
Disconnect the alternator/starter 6P (Natural) and 3P (Brown) connectors.



Release the wires from the wire bands.



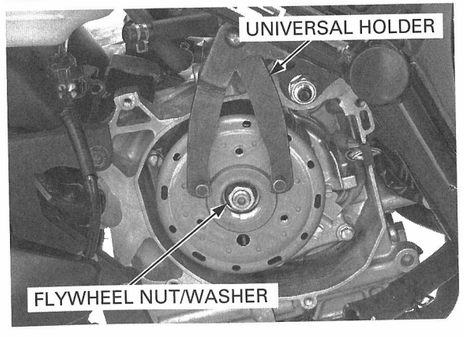
Remove the three bolts and cooling fan.



Hold the flywheel with the special tool and loosen the flywheel nut.

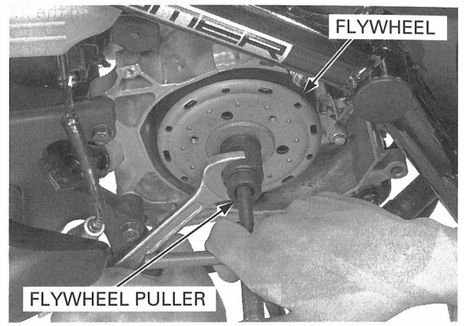
TOOL:
Universal holder **07725-0030000**

Remove the flywheel nut and washer.

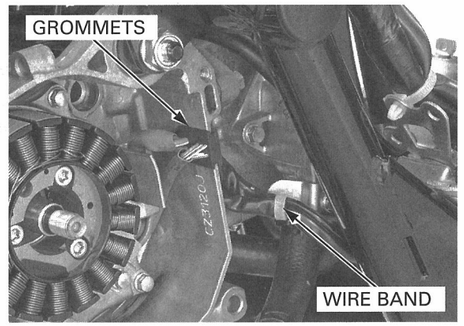


Remove the flywheel using the special tool.

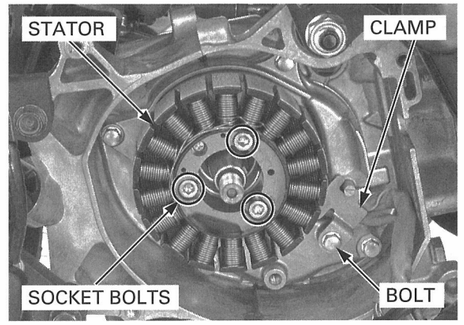
TOOL:
Flywheel puller **07733-0010000**



Remove the wire band from the water pump stay.
Remove the grommets from the crankcase groove.



Remove the bolt and clamp.
Remove the socket bolts and stator.

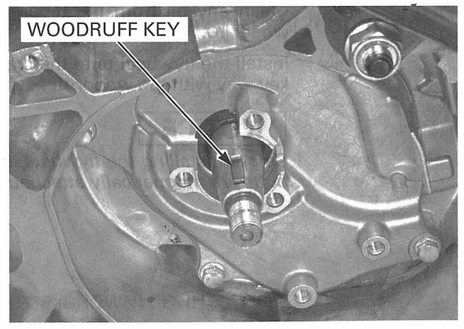


Remove the woodruff key from the crankshaft.

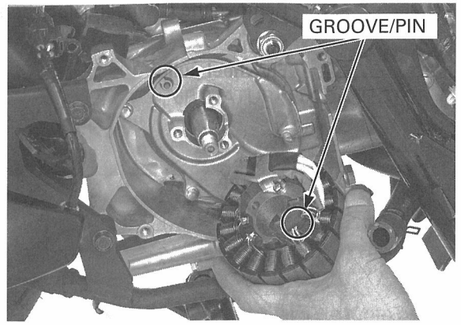
INSTALLATION

Clean any oil from the tapered portion of the crankshaft and flywheel.

Install the woodruff key in the crankshaft key groove.



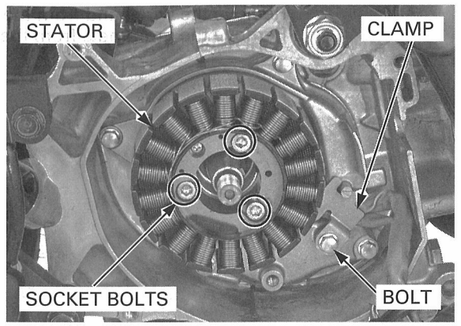
Install the stator aligning the its groove to the pin on the stator base.



Install and tighten the socket bolts to the specified torque.

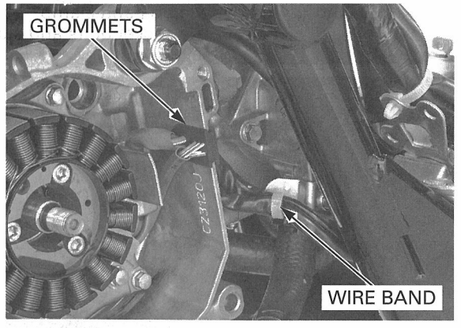
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the wire clamp properly as shown.
Route the alternator/starter wires under the guide of the stator base.
Tighten the bolt securely.



Install the grommet to the crankcase groove properly.

Install the wire band to the water pump stay.

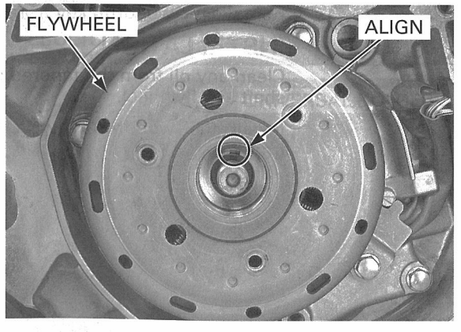


Clean any oil from the tapered portion of the flywheel I.D.

Install the flywheel onto the crankshaft, aligning the key way with the woodruff key.

NOTICE

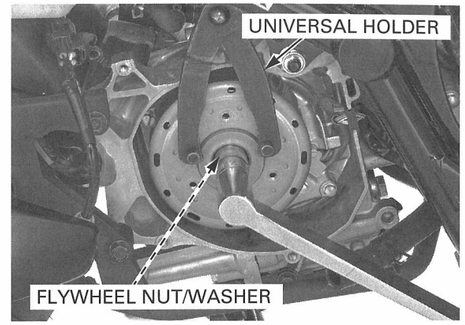
Before installing the flywheel, check that no nuts or bolts are magnetically attached to the flywheel.



Install the washer and flywheel nut.
Hold the flywheel with the special tool and tighten the flywheel nut to the specified torque.

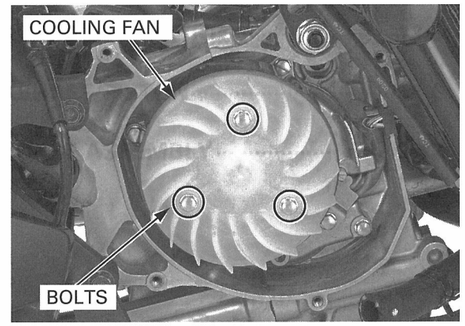
TOOL:
Universal holder **07725-0030000**

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)

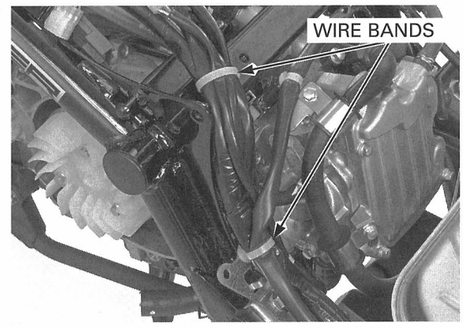


Install the cooling fan and tighten the bolts to the specified torque.

TORQUE: 7.8 N·m (0.8 kgf·m, 5.8 lbf·ft)



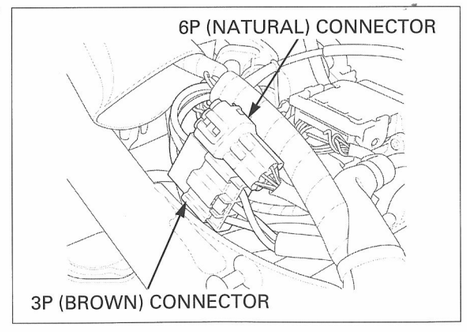
Route and clamp the alternator/starter wire properly (page 1-15).



Connect the alternator/starter 3P (Brown) and 6P (Natural) connectors.

Install the following:

- Radiator (page 7-15)
- Floor step (page 3-7)



MEMO

13. CRANKSHAFT/PISTON/CYLINDER

COMPONENT LOCATIONS 13-2

SERVICE INFORMATION 13-3

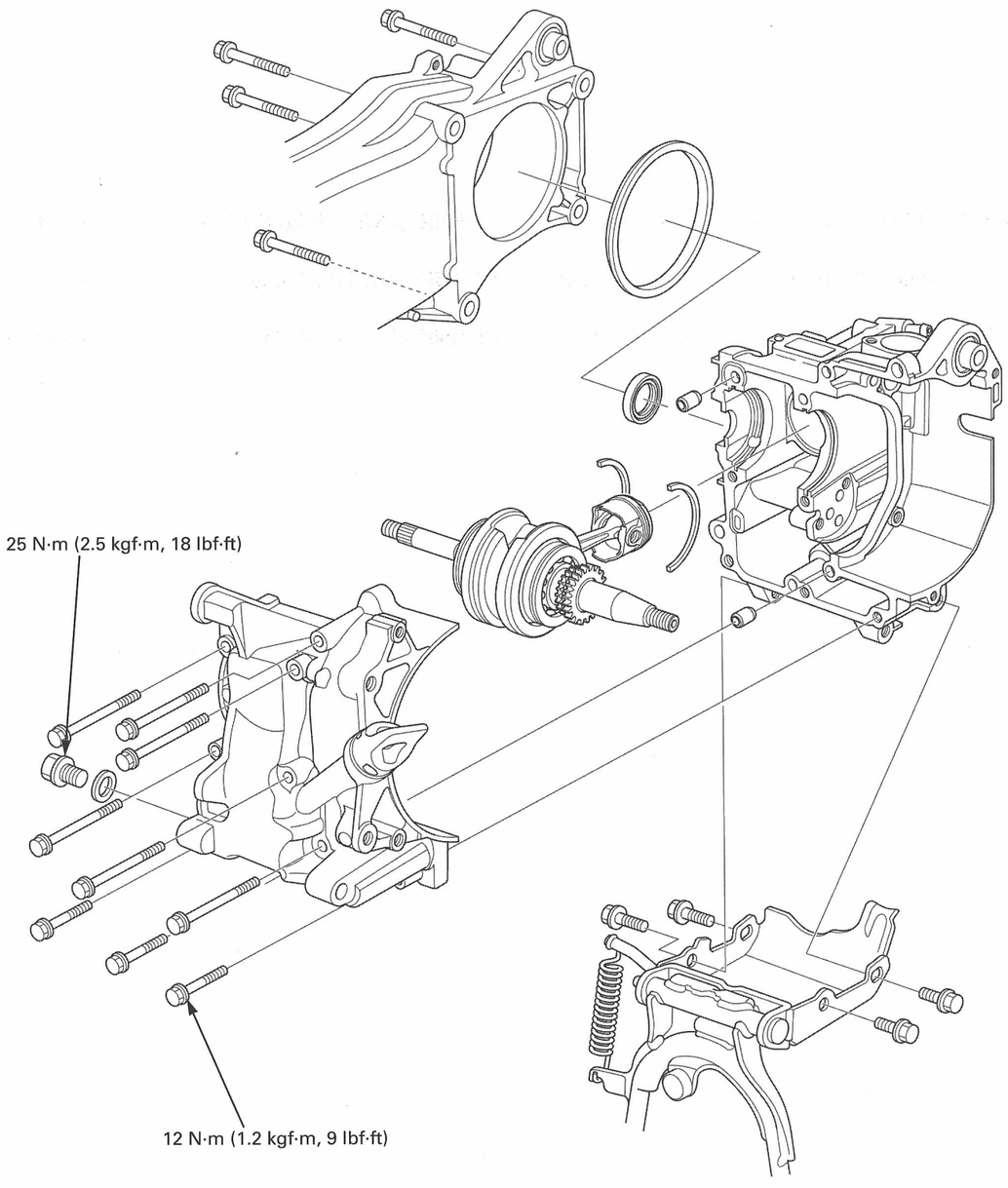
TROUBLESHOOTING 13-4

CRANKCASE SEPARATION 13-5

CRANKSHAFT/PISTON 13-6

CRANKCASE ASSEMBLY 13-12

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

- This section covers the crankcase separation to service the crankshaft, piston and cylinder.
- The following parts must be removed before separating the crankcase.
  - Oil pump (page 5-4)
  - Water pump (page 7-8)
  - Throttle body (page 6-55)
  - Engine (page 8-4)
  - Cylinder head (page 9-10)
  - Drive pulley (page 10-9)
  - Alternator/Starter (page 12-4)
- Be careful not to damage the crankcase mating surfaces when separating and assembling the crankcase halves.
- Take care not to damage the cylinder wall and piston.
- Clean all disassembled parts with clean solvent and dry them using compressed air before inspection.

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Crankshaft	Connecting rod side clearance		0.10 – 0.40 (0.004 – 0.016)	0.60 (0.024)
	Connecting rod radial clearance		0.004 – 0.016 (0.0002 – 0.0006)	0.05 (0.002)
	Runout		–	0.10 (0.0039)
Cylinder	I.D.		38.000 – 38.010 (1.4900 – 1.4964)	38.04 (1.4966)
	Out-of-round		–	0.05 (0.002)
	Taper		–	0.05 (0.002)
	Warpage		–	0.05 (0.002)
Piston, piston ring, piston pin	Piston O.D.		37.975 – 37.995 (1.4951 – 1.4959)	37.92 (1.493)
	Piston O.D. measurement point		10 mm (0.39 in) from bottom of skirt	–
	Piston pin bore I.D.		10.002 – 10.008 (0.3938 – 0.3940)	10.04 (0.395)
	Piston pin O.D.		9.994 – 10.000 (0.3935 – 0.3937)	9.98 (0.393)
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.04 (0.002)
	Piston ring-to-ring groove clearance	Top	0.015 – 0.045 (0.0006 – 0.0018)	0.08 (0.003)
		Second	0.015 – 0.050 (0.006 – 0.0020)	0.08 (0.003)
	Piston ring end gap	Top	0.05 – 0.15 (0.002 – 0.006)	0.40 (0.016)
		Second	0.05 – 0.17 (0.002 – 0.007)	0.40 (0.016)
		Oil (side rail)	0.10 – 0.60 (0.004 – 0.024)	0.80 (0.031)
Cylinder-to-piston clearance			0.005 – 0.035 (0.0002 – 0.0014)	0.08 (0.003)
Connecting rod small end I.D.			10.013 – 10.028 (0.3942 – 0.3948)	10.05 (0.396)
Connecting rod-to-piston pin clearance			0.013 – 0.034 (0.0005 – 0.0013)	0.06 (0.002)

TORQUE VALUES

Crankcase bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply oil to the threads and seating surface
Engine oil drain bolt	25 N·m (2.5 kgf·m, 18 lbf·ft)	

TROUBLESHOOTING

Compression too low, hard starting or poor performance at low speed
- Worn, stuck or broken piston ring
- Worn or damaged cylinder and piston
- Cylinder head/valve problem (page 9-3)

Compression too high, overheating or knocking
- Excessive carbon build-up on piston head or on combustion chamber

Excessive smoke
- Worn cylinder, piston or piston ring
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall
- Cylinder head/valve problem (page 9-3)

Abnormal noise
- Worn piston pin or piston pin hole
- Worn connecting rod small end
- Worn cylinder, piston or piston rings
- Worn crankshaft bearing
- Worn connecting rod big end bearing

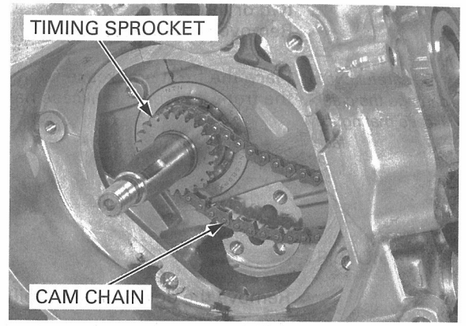
CRANKCASE SEPARATION

Remove the engine from the frame (page 8-4).

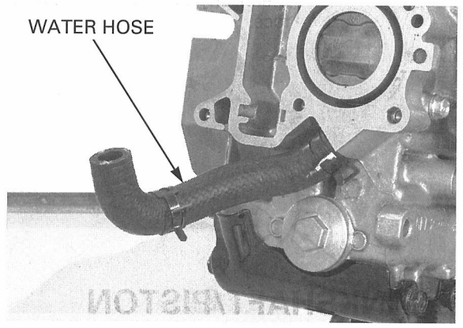
Remove the following:

– Cylinder head/cam chain (page 9-10)
– Oil pump (page 5-4)
– Drive pulley (page 10-9)

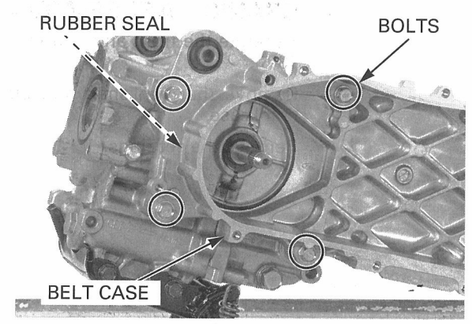
Remove the cam chain from the timing sprocket.



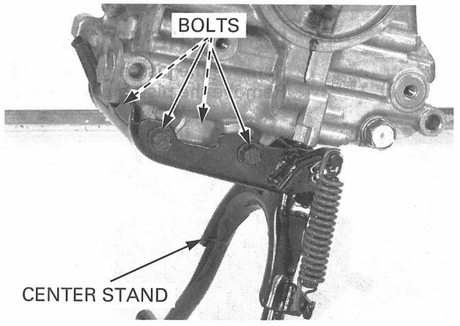
Remove the water hose from the crankcase.



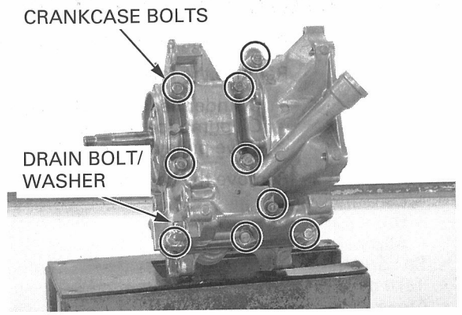
Remove the four bolts and belt case.
Remove the rubber seal.



Remove the four bolts and center stand from the crankcase.



Remove the drain bolt and sealing washer.
Loosen the crankcase bolts in a crisscross pattern in two or three steps.
Remove the crankcase bolts.

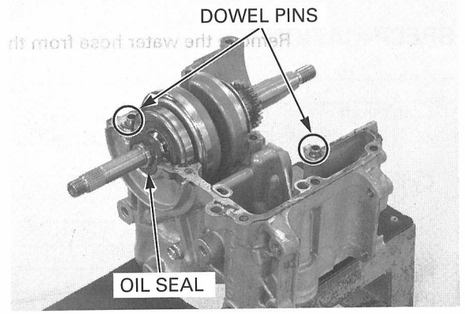


Be careful not to damage the crankcase mating surface.

Place the front crankcase facing down and separate the front and rear crankcase halves.

Remove the dowel pins and oil seal.

Clean any sealant from the crankcase mating surface.



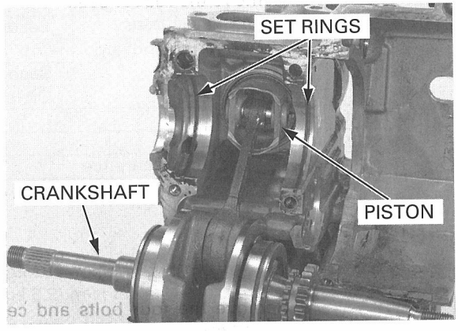
CRANKSHAFT/PISTON

CRANKSHAFT REMOVAL

Separate the front and rear crankcase halves (page 13-5).

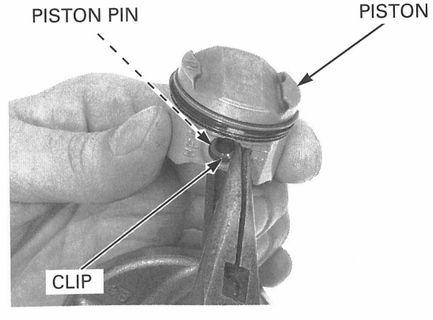
Remove the crankshaft and piston from the front crankcase.

Remove the set rings.



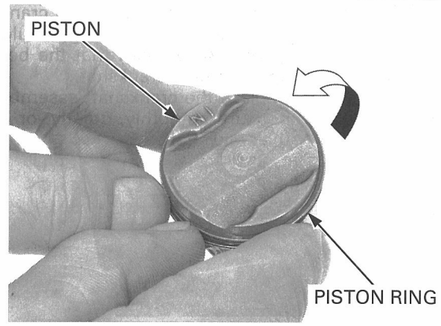
PISTON REMOVAL

Remove the piston pin clips with pliers.
Remove the piston pin out of the piston.



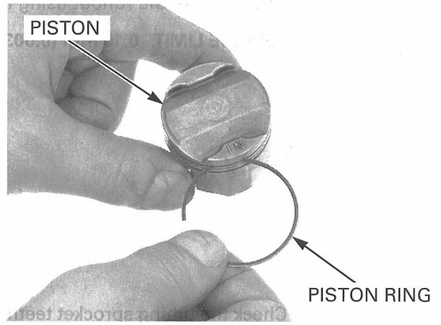
Do not damage the piston ring by spreading the ends too far.

Spread each piston ring and remove them by lifting up at a point opposite the gap.



Never use a wire brush, it will scratch the groove.

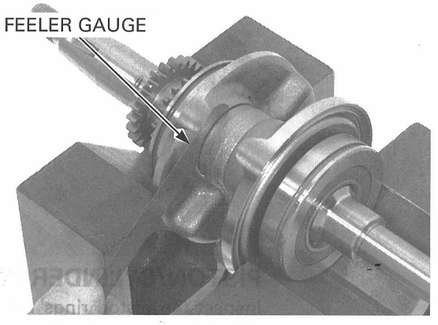
Clean carbon deposits from the ring grooves with a ring that will be discarded.



CRANKSHAFT INSPECTION

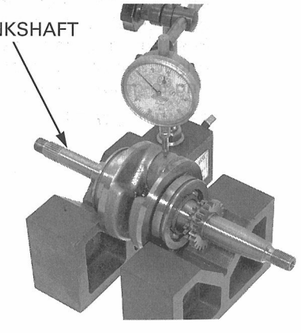
Measure the connecting rod big end side clearance with a feeler gauge.

SERVICE LIMIT: 0.60 mm (0.024 in)

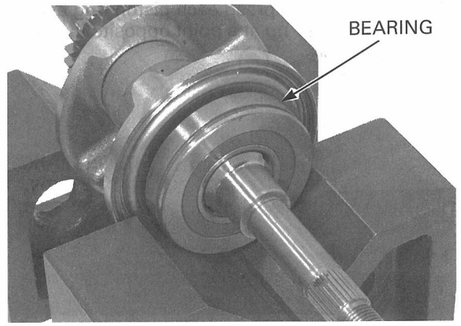


Set the crankshaft on V-blocks and read the runout points as shown, using a dial indicator. Actual runout is 1/2 of total indicator reading.

SERVICE LIMIT: 0.05 mm (0.002 in)

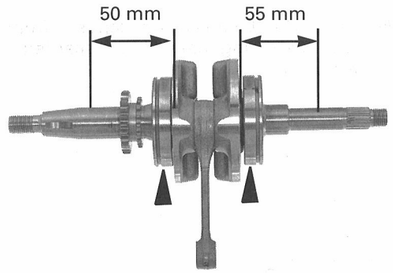


Turn the outer race of the crankshaft bearings with your finger. The bearing should turn smoothly and quietly. Also check that the bearing inner race fits tightly on the crankshaft.
Replace the crankshaft assembly if the bearings do not turn smoothly, quietly, or if they fit loosely on the crankshaft.



Set the crankshaft on a turning stand or V-blocks and measure the runout using a dial indicator.

SERVICE LIMIT: 0.10 mm (0.0039 in)



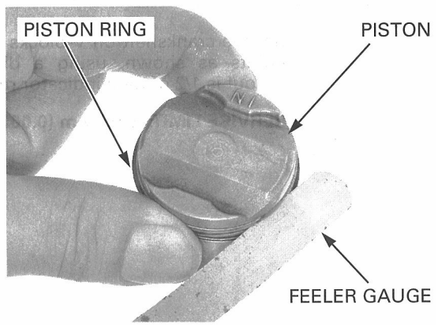
Check the timing sprocket teeth for wear or damage.

PISTON/CYLINDER INSPECTION

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.
Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-groove clearance.

SERVICE LIMITS:

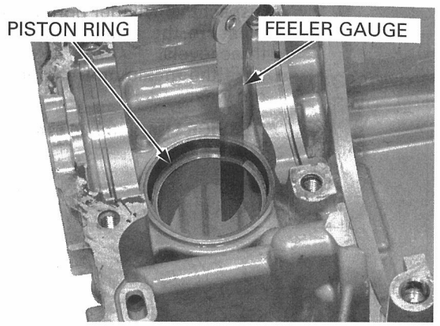
Top:	**0.08 mm (0.003 in)**
Second:	**0.08 mm (0.003 in)**



Insert each piston ring into the bottom of the cylinder squarely using the piston.
Measure the ring end gap.

SERVICE LIMITS:

Top/Second:	**0.40 mm (0.016 in)**
Oil (side rail):	**0.80 mm (0.031 in)**



Measure the piston pin bore I.D. Take the maximum reading to determine I.D.

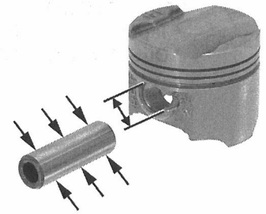
SERVICE LIMIT: 10.04 mm (0.395 in)

Measure the piston pin O.D. at piston and connecting rod sliding areas.

SERVICE LIMIT: 9.98 mm (0.393 in)

Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.04 mm (0.002 in)

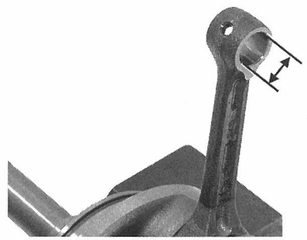


Measure the connecting rod small end I.D.

SERVICE LIMIT: 10.05 mm (0.396 in)

Calculate the connecting rod-to-piston pin clearance.

SERVICE LIMIT: 0.06 mm (0.002 in)

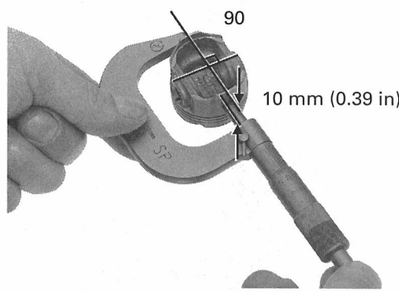


Measure the piston O.D. at the point 10 mm (0.39 in) from the bottom of skirt and 90° to the piston pin hole.

SERVICE LIMIT: 37.92 mm (1.493 in)

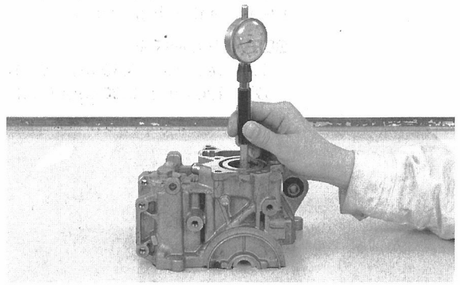
Calculate the cylinder-to-piston clearance (cylinder I.D.: see below).

SERVICE LIMIT: 0.08 mm (0.003 in)



Inspect the cylinder bore for wear or damage.
Measure the cylinder I.D. in the X and Y axes at three levels.
Take the maximum reading to determine the cylinder wear.

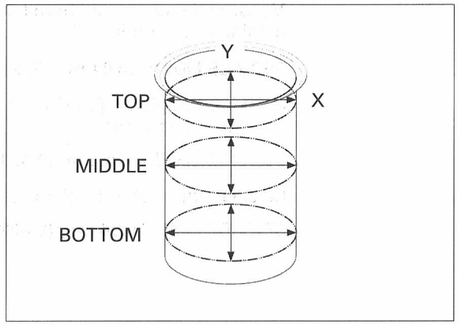
SERVICE LIMIT: 38.04 mm (1.4966 in)



Calculate the taper and out-of-round at three levels in the X and Y axes. Take the maximum reading to determine both measurements.

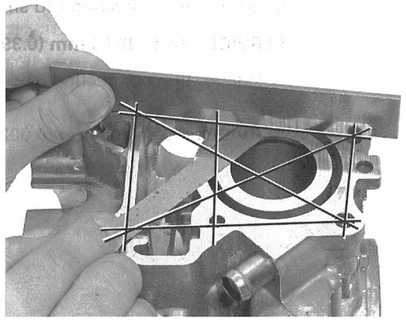
SERVICE LIMITS:

Taper:	**0.05 mm (0.002 in)**
Out-of-round:	**0.05 mm (0.002 in)**



Check the cylinder for warpage with a straight edge and feeler gauge in the directions shown.

SERVICE LIMIT: 0.05 mm (0.002 in)



PISTON INSTALLATION

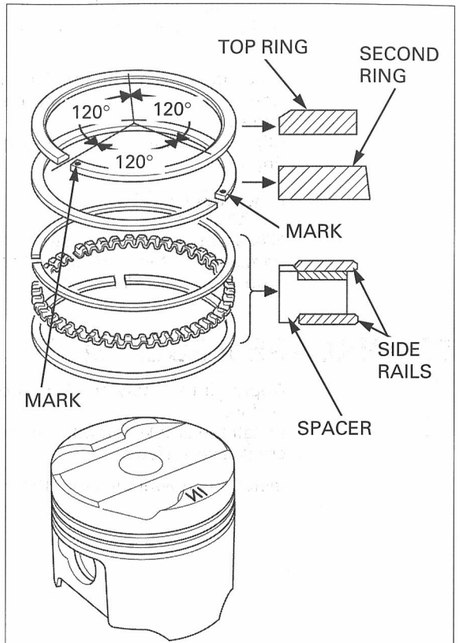
Be careful not to damage the piston and rings.

Coat the piston and each piston ring with oil.

Carefully install the piston rings into the piston ring grooves with their markings facing up

NOTE:
- Do not confuse the top and second rings.
- To install the oil ring, install the spacer first, then install the side rails.

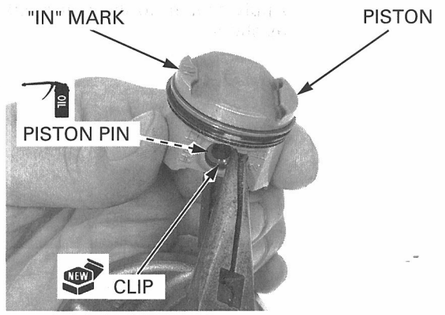
Stagger the piston ring end gaps 120 degrees apart from each other.
Stagger the side rail end gaps as shown.



Apply engine oil to the connecting rod small end, piston pin and piston pin bore.
Install the piston with the "IN" mark facing the intake side.

Install the piston pin and new piston pin clips.

NOTE:
- Make sure the piston pin clips are seated securely.
- Do not align the piston pin clip end gap with the piston cut-out.

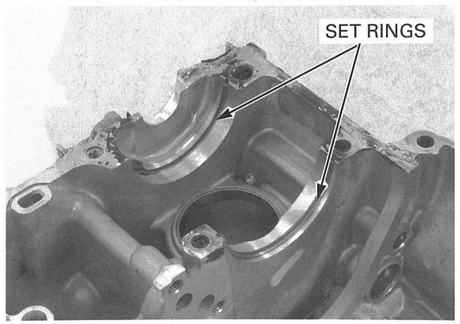


CRANKSHAFT INSTALLATION

Be careful not to damage the crankcase mating surface.

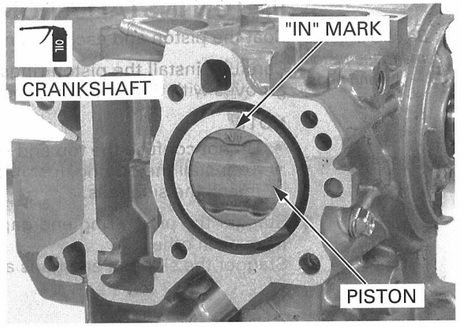
Clean the insides of the crankcases and check for cracks or other damage.
Clean the crankcase mating surface.
Dress any minor roughness or irregularities with an oil stone if necessary.

Install the set rings into the crankcase grooves.



Apply engine oil to the connecting rod big end bearing (3 cm^3), crankshaft main journal bearings (2 cm^3 each), cylinder wall, piston and piston ring outer surface.

Install the piston with the "IN" mark facing the intake side while compressing the piston rings with your fingers.
Align the crankshaft bearing grooves with the set rings.



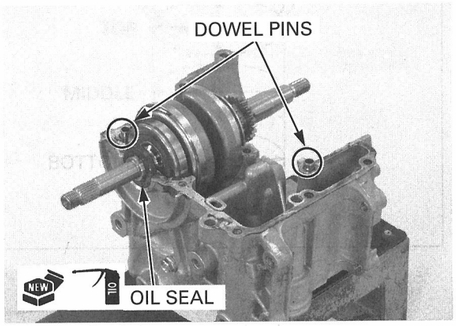
NOTICE

While installing the piston, being careful not to damage the top surface of the cylinder, especially around the cylinder bore.

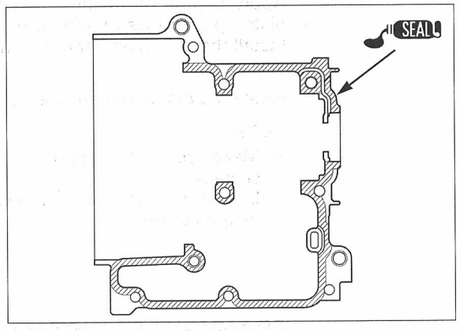
CRANKCASE ASSEMBLY

Apply oil to a new crankshaft oil seal lip and outer surface.
Install the crankshaft oil seal until it is flush with the crankcase surface.

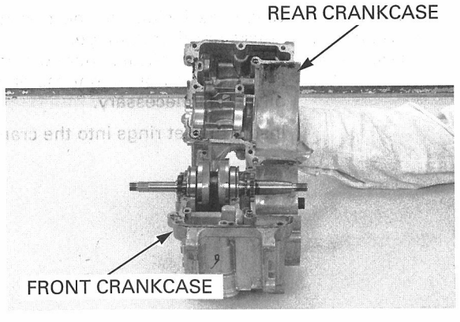
Install the dowel pins into the front crankcase.



Apply sealant to the rear crankcase mating surface as shown.



Install the rear crankcase over the front crankcase.

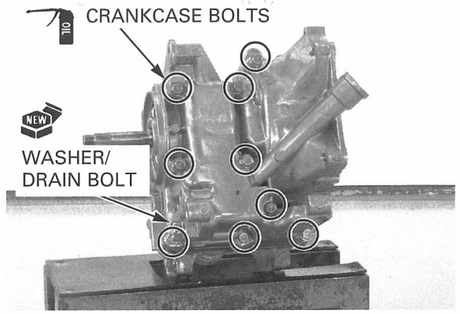


Apply engine oil to the crankcase bolt threads and seating surfaces.
Install the bolts and tighten them in a crisscross pattern in two or three steps.

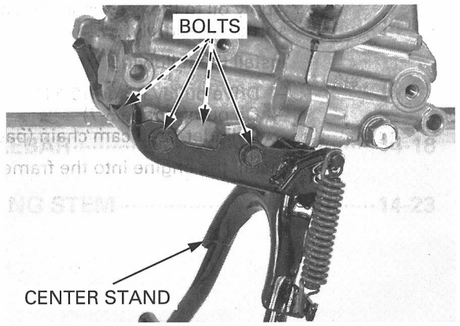
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install a new sealing washer and drain bolt.
Tighten the drain bolt to the specified torque.

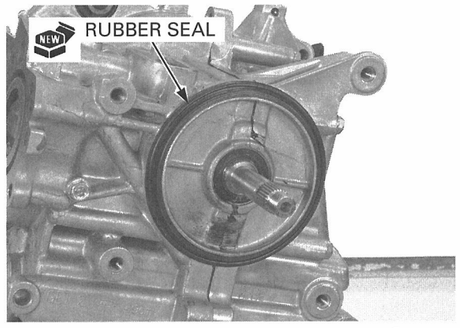
TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)



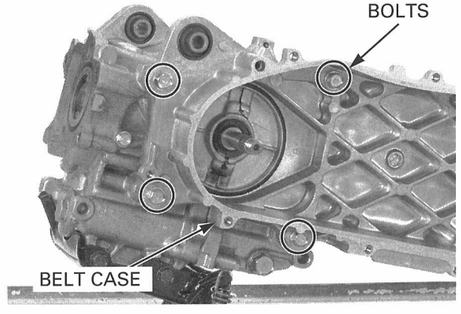
Install the center stand, bolts and tighten the bolts securely.



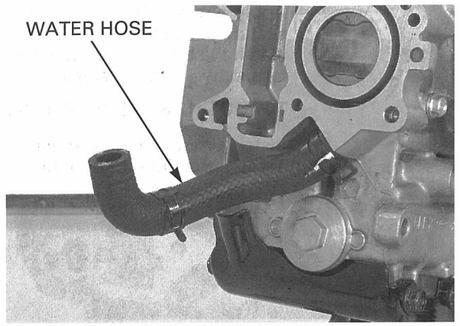
Clean the belt case mating surface of the crankcase.
Install a new rubber seal onto the crankcase.



Install the belt case and tighten the bolts securely.



Connect the water hose.

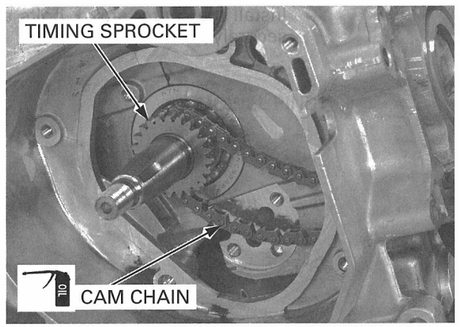


Apply oil to the cam chain and install it to the timing sprocket securely.

Install the following:

- Drive pulley (page 10-11)
- Oil pump (page 5-7)
- Cylinder head/cam chain (page 9-19)

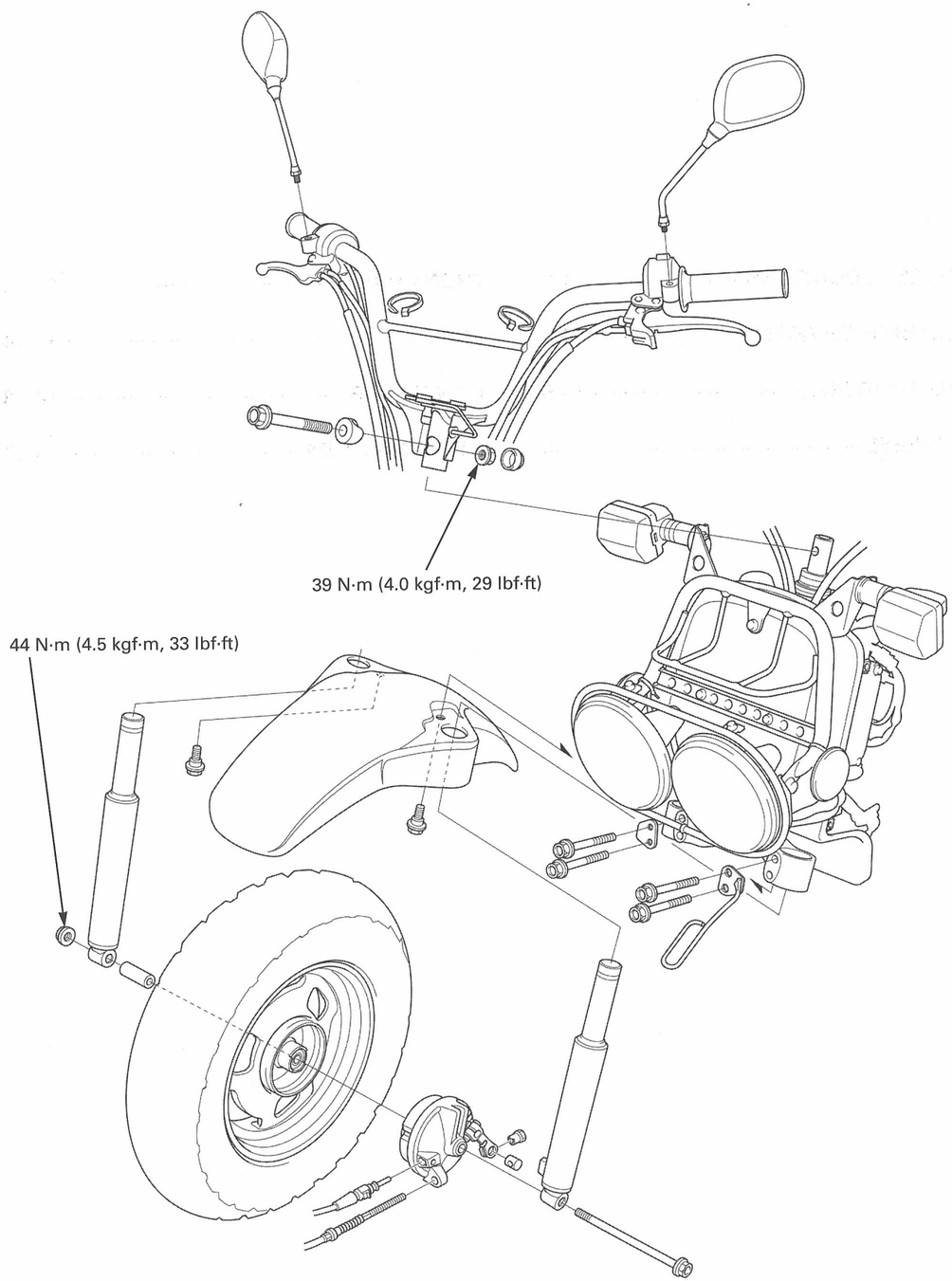
Install the engine into the frame (page 8-7).



14. FRONT WHEEL/BRAKE/SUSPENSION/STEERING

COMPONENT LOCATIONS 14-2
SERVICE INFORMATION 14-3
TROUBLESHOOTING 14-5
FRONT WHEEL 14-6
FRONT BRAKE 14-10
FORK 14-14
HANDLEBAR 14-18
STEERING STEM 14-23

COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

⚠ CAUTION

Frequent inhalation of brake shoe dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

- This section covers the front wheel, fork, handlebar, brake and steering.
- When servicing the front wheel, fork or steering stem, support the motorcycle using a safety stand or hoist.
- Use only tires marked "TUBELESS" and tubeless valve stems on rims marked "TUBELESS TIRE APPLICABLE".
- Use genuine Honda replacement bolts and nuts for all suspension pivots and mounting points.

SPECIFICATIONS

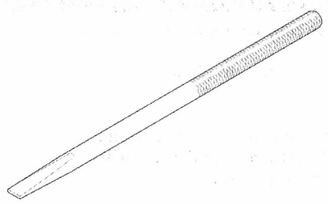
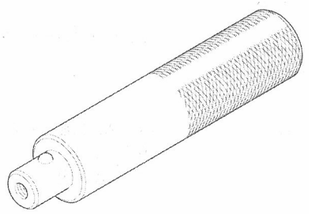
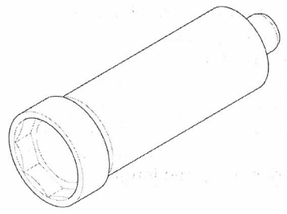
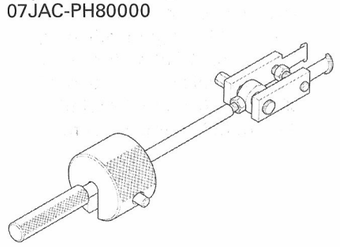
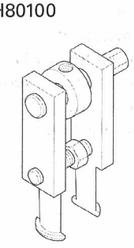
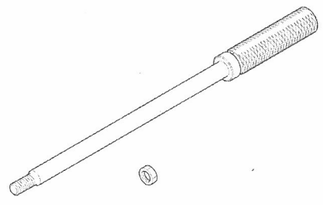
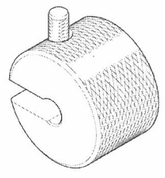
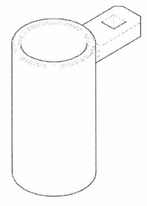
Unit: mm (in)

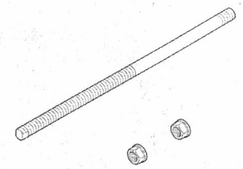
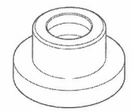
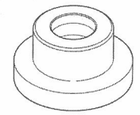
ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	0.8 (0.03)
Cold tire pressure		175 kPa (1.75 kgf/cm², 25 psi)	–
Axle runout		–	0.20 (0.008)
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)
Brake	Front brake lever free play	10 – 20 (3/8 – 13/16)	–
	Brake drum I.D.	95.0 (3.74)	95.5 (3.76)
Fork spring free length		128.5 (5.06)	125.9 (4.96)

TORQUE VALUES

Front axle nut	44 N·m (4.5 kgf·m, 33 lbf·ft)	U-nut
Front brake arm bolt	6.0 N·m (0.62 kgf·m, 4.5 lbf·ft)	
Front/rear brake lever pivot bolt	1.0 N·m (0.11 kgf·m, 0.8 lbf·ft)	
Front/rear brake lever pivot nut	5.2 N·m (0.53 kgf·m, 3.8 lbf·ft)	
Handlebar post nut	39 N·m (4.0 kgf·m, 29 lbf·ft)	U-nut
Steering stem lock nut	69 N·m (7.0 kgf·m, 51 lbf·ft)	

TOOLS

Bearing remover shaft 07746-0050100 	Bearing remover head, 10 mm 07746-0050200 	Pilot, 10 mm 07746-0040100 
Attachment, 28 x 30 mm 07946-1870100 	Driver 07749-0010000 	Socket wrench, 32 mm 07916-KM10000 
Fork seal driver, 27 mm 07947-1180001 	Adjustable bearing remover set 07JAC-PH80000 	Remover head 07JAC-PH80100 
Remover shaft 07JAC-PH800200 	Remover weight 07741-0010201 	Lock nut wrench, 45 x 54 mm 07SMA-GBC0100 

Installer shaft 07VMF-KZ30200 	Stem race installer, 26 x 47 mm 07XMF-GEE0100 	Stem race installer, 29 x 50 mm 07XMF-GEE 200 

TROUBLESHOOTING

Hard steering
- Steering top cone race too tight
- Faulty steering head bearing
- Bent steering stem
- Insufficient tire pressure
- Faulty tire

Steers to one side or does not track straight
- Bent fork
- Bent axle
- Wheel installed incorrectly
- Bent frame
- Worn wheel bearings
- Worn or damaged engine mounting bushings (page 8-2)

Front wheel wobbles
- Bent rim
- Worn or damaged front wheel bearings

Front wheel hard to turn
- Faulty wheel bearings
- Brake drag (page 14-10)
- Bent front axle

Soft suspension
- Weak fork spring
- Low tire pressure

Suspension noisy
- Loose fork fasteners
- Faulty front fork

Poor brake performance
- Incorrect adjustment of brake lever
- Contaminated brake shoes
- Worn brake shoes
- Worn brake cam
- Worn brake drum

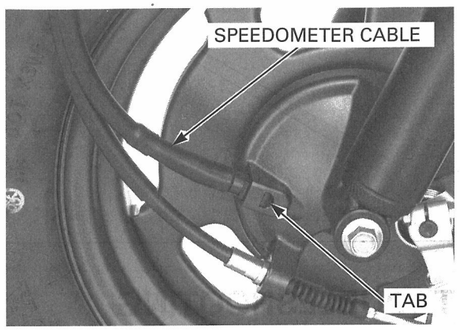
FRONT WHEEL

REMOVAL

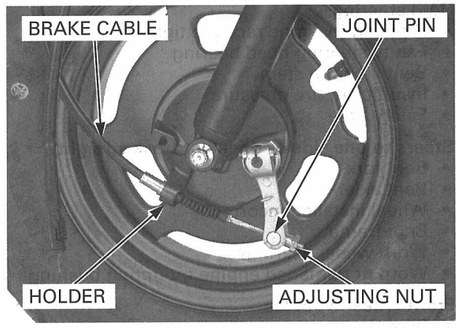
Loosen the front axle nut.

Disconnect the speedometer cable from the brake panel by pushing the cable tab.

Remove the O-ring from the speedometer cable.

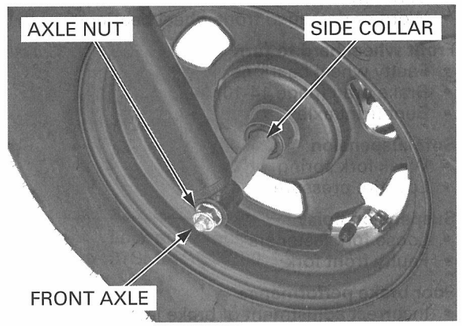


Remove the adjusting nut and brake cable from the joint pin and cable holder.
Remove the joint pin from the brake arm.



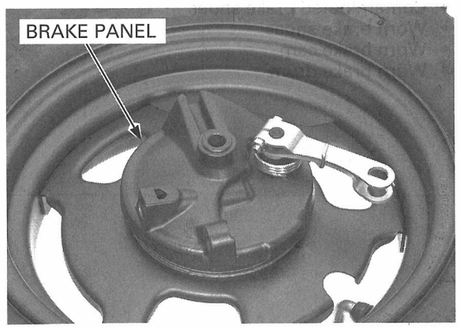
Support the scooter securely using a hoist or equivalent and raise the front wheel off the ground.

Remove the front axle nut.
Remove the front axle, side collar and front wheel.



Remove the brake panel from the left side of the wheel.

Refer to page 14-10 for brake panel disassembly.

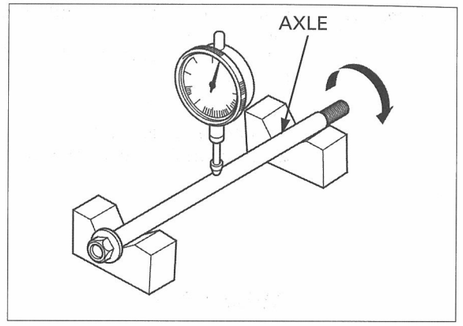


INSPECTION

AXLE

Place the axle in V-blocks and measure the runout.
Actual runout is 1/2 the total indicator reading.

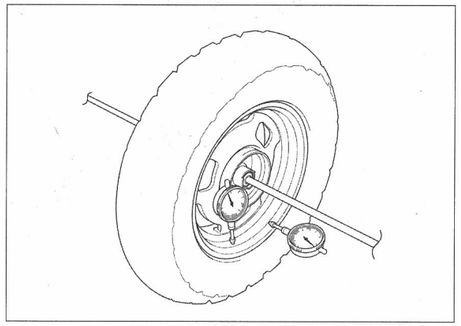
SERVICE LIMIT: 0.20 mm (0.008 in)



WHEEL

Check the rim runout by placing the wheel in a turning stand.
Spin the wheel slowly and read the runout using a dial indicator.
Actual runout is 1/2 the total indicator reading.

SERVICE LIMITS:
Radial: 2.0 mm (0.08 in)
Axial: 2.0 mm (0.08 in)

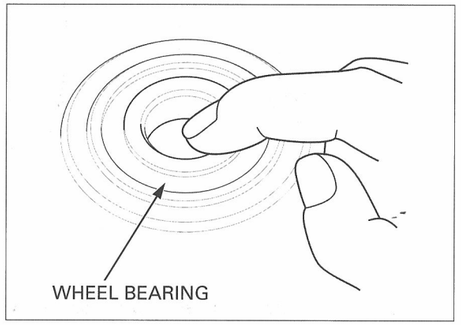


WHEEL BEARING

Turn the inner race of each bearing with your finger.
The bearings should turn smoothly and quietly.
Also check that the bearing outer race fits tightly in the hub.

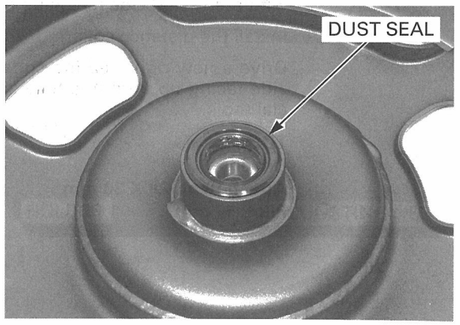
Replace the wheel bearings in pairs.

Remove and discard the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the hub.



DISASSEMBLY

Remove the dust seal.

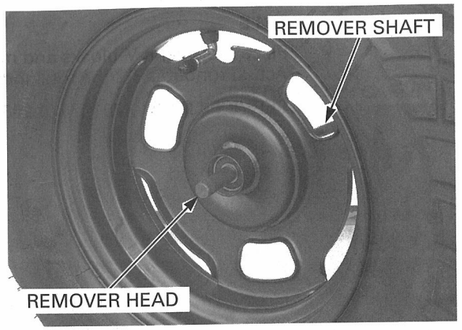


Replace the wheel bearings in pairs. Do not reuse old bearings.

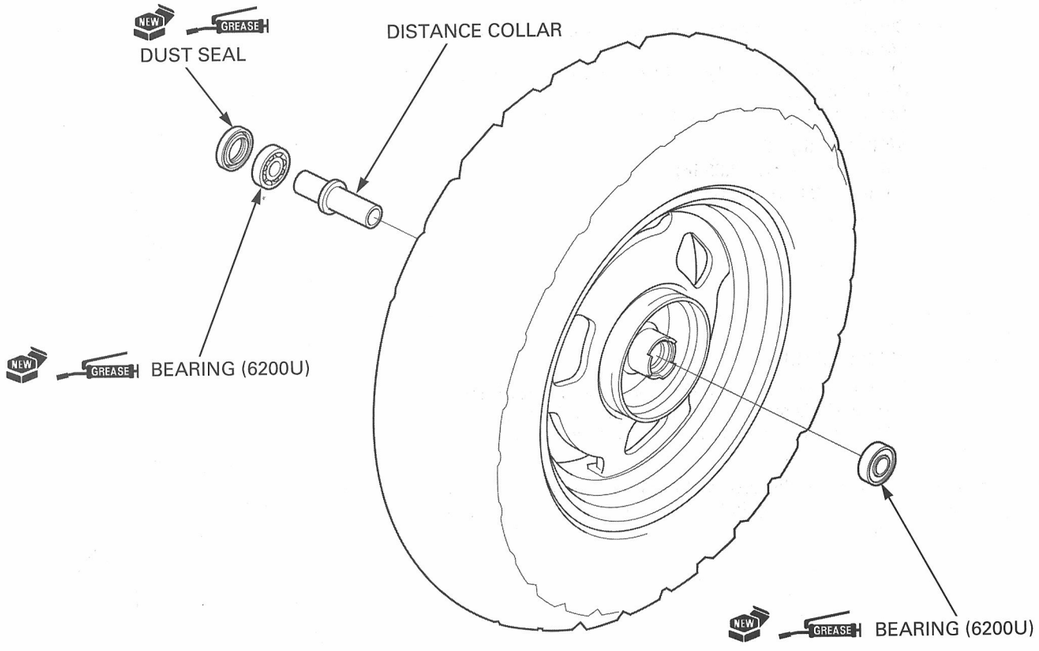
Install the bearing remover head into the bearing.
From the opposite side of the wheel, install the bearing remover shaft and drive the bearing out of the wheel hub.
Remove the distance collar and drive out the other bearing.

TOOLS:

Bearing remover shaft	**07746-0050100**
Bearing remover head, 10 mm	**07746-0050200**



ASSEMBLY



Pack the new bearing cavities with grease.

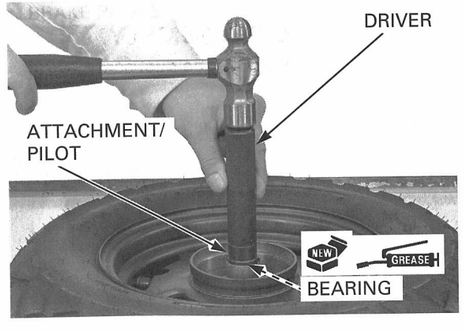
Drive a new left bearing (brake drum side) squarely with the sealed side facing up until it is fully seated.

Install the distance collar.

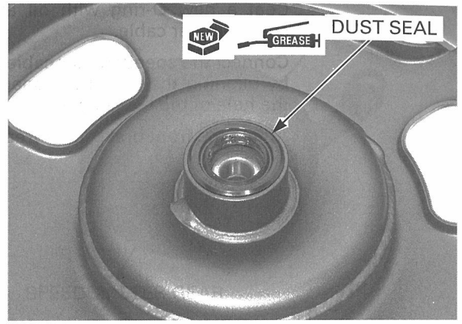
Drive a new right bearing squarely with the sealed side facing up until it is fully seated using the special tools.

TOOLS:

Driver	**07749-0010000**
Attachment, 28 X 30 mm	**07946-1870100**
Pilot, 10 mm	**07746-0040100**

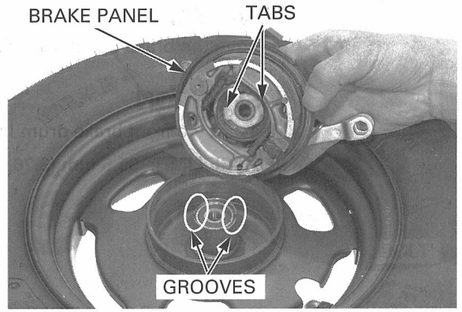


Apply grease to new dust seal lips.
Install the dust seal into the left wheel hub until it is flush with the wheel hub.



INSTALLATION

Install the brake panel aligning the tabs of the speedometer gear with the grooves of the wheel hub.

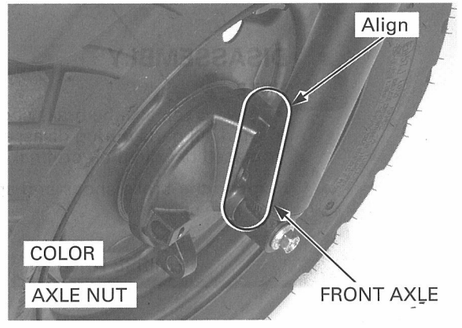


Install the front wheel between the fork legs aligning the brake panel groove with the left fork leg tab.

Install the color and front axle from the right side.

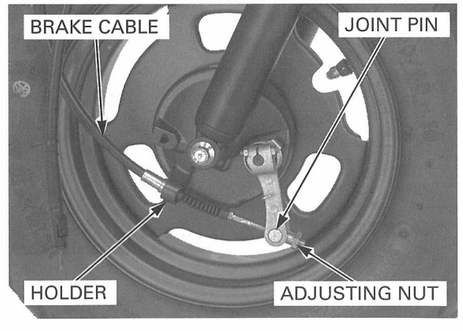
Install the axle nut and tighten it to the specified torque.

TORQUE: 44 N·m (4.5 kgf·m, 33 lbf·ft)



Route the cable properly.

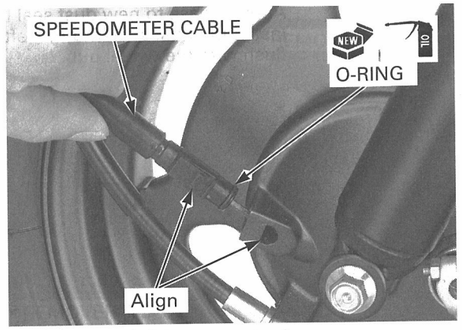
Install the joint pin into the brake arm.
Connect the brake cable through the cable holder to the joint pin and install the adjusting nut.



Coat a new O-ring with oil and install it on the speedometer cable.

Connect the speedometer cable into the brake panel by aligning the tab of the speedometer cable with the hole of the brake panel.

Adjust the front brake lever free play (page 4-13).



FRONT BRAKE

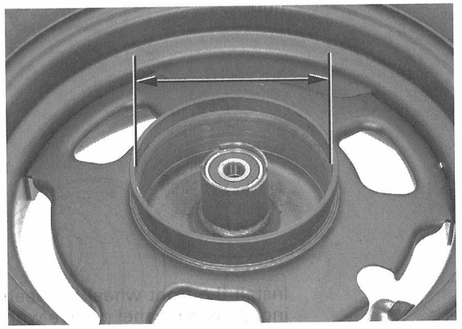
REMOVAL

Remove the brake panel from the front wheel (page 14-6).

INSPECTION

Measure the front brake drum I.D.

SERVICE LIMIT: 95.5 mm (3.76 in)

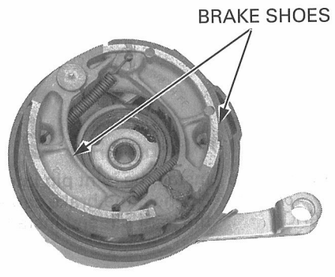


DISASSEMBLY

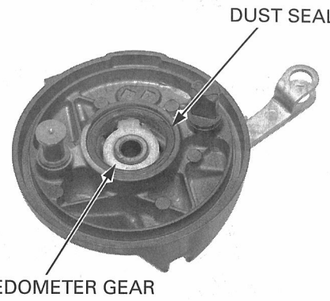
NOTE:

- Always replace the brake shoes as a set.
- Mark all parts during disassembly so they can be placed back in their original locations.

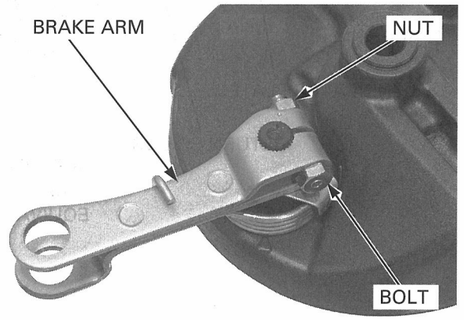
Remove the brake shoes and springs by spreading the brake shoes.



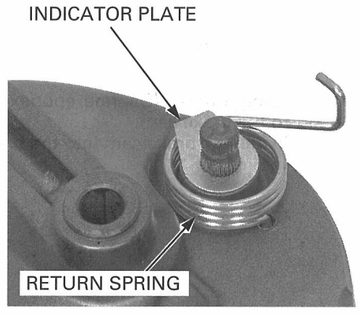
Remove the dust seal and speedometer gear.



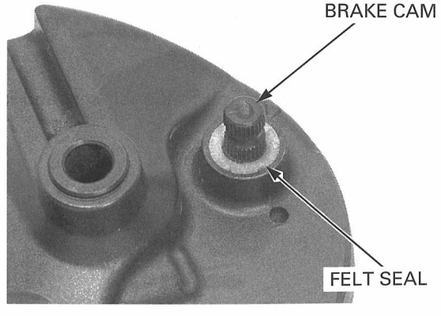
Remove the bolt, nut and brake arm.



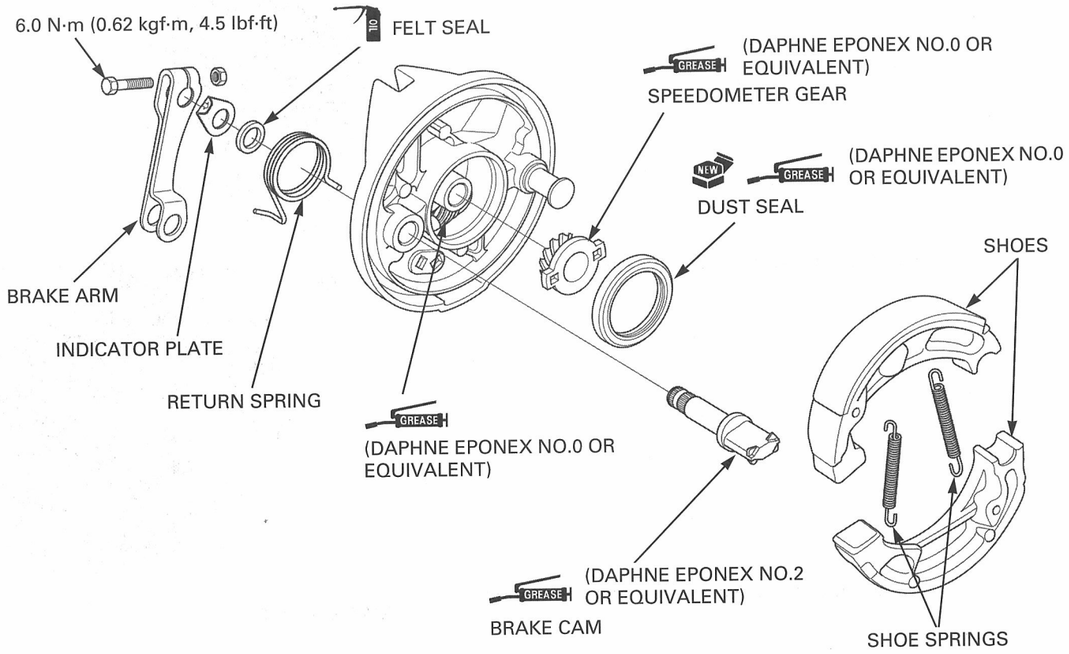
Remove the wear indicator plate and return spring.



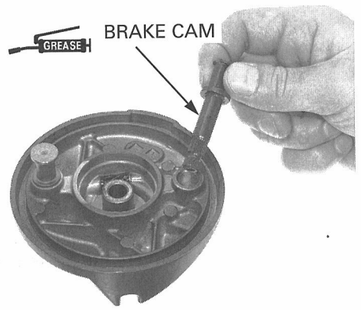
Remove the felt seal.
Remove the brake cam from the brake panel.



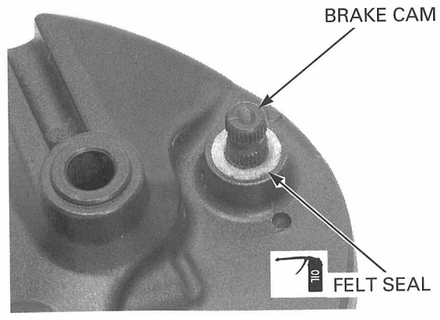
ASSEMBLY



Apply grease (Daphne eponex No.2 or equivalent) to the brake cam.
Install the brake cam into the brake panel.

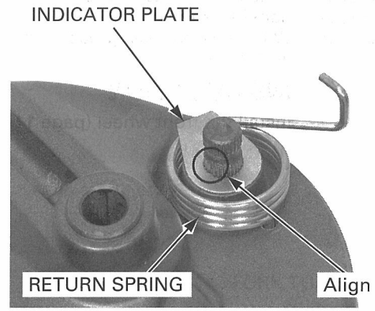


Apply oil to the felt seal and install it to the brake cam.



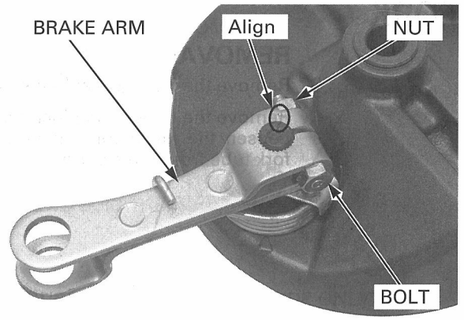
Install the return spring, aligning its end with the brake panel hole as shown.

Install the wear indicator onto the brake cam by aligning its wide tooth with the wide groove of the brake cam.

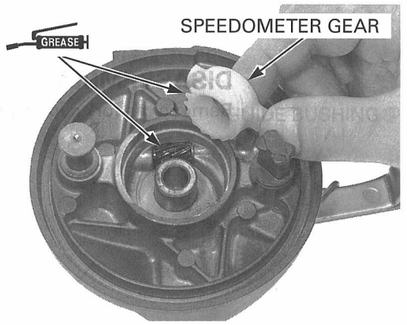


Install the brake arm by aligning the punch marks on the brake arm and brake cam.
Install the brake arm pinch bolt and nut as shown and tighten the bolt to the specified torque.

TORQUE: 6.0 N·m (0.62 kgf·m, 4.5 lbf·ft)

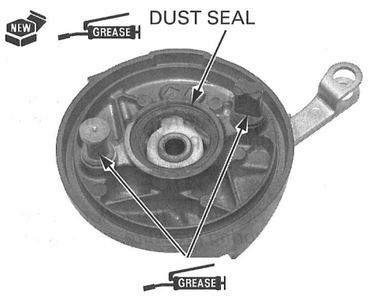


Apply grease (Daphne eponex No.0 or equivalent) to the speedometer gear and pinion gear sliding surface.
Install the speedometer gear.



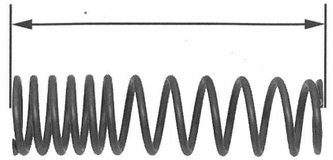
Apply grease (Daphne eponex No.0 or equivalent) to a new dust seal lip and install it into the brake panel.

Apply grease to the anchor pin and brake cam sliding surfaces.



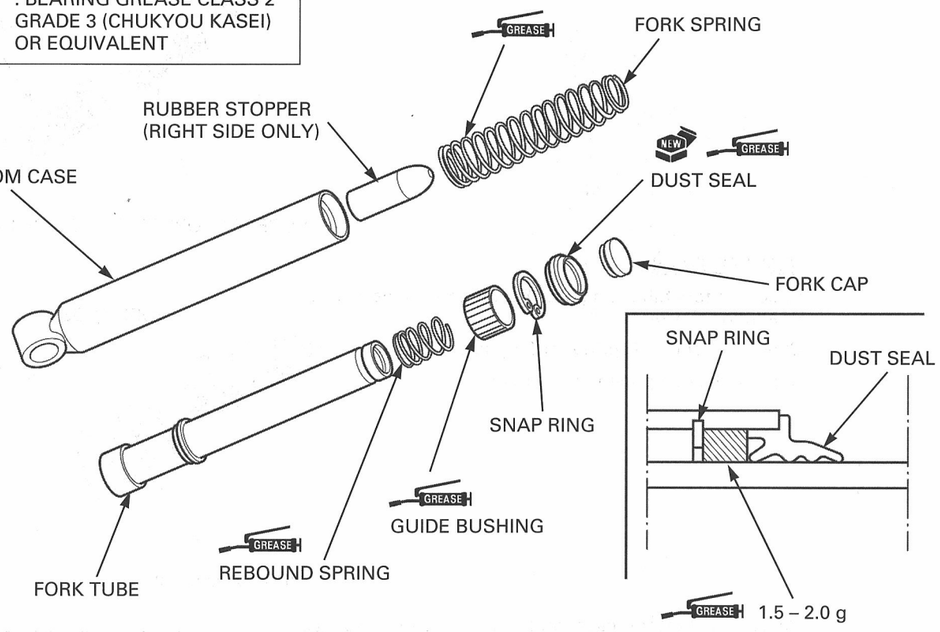
Measure the fork spring free length.

SERVICE LIMIT: 125.9 mm (4.96 in)



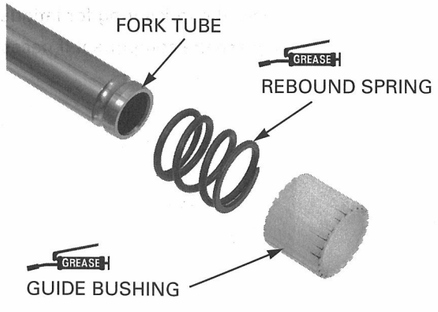
ASSEMBLY

GREASE : BEARING GREASE CLASS 2 GRADE 3 (CHUKYOU KASEI) OR EQUIVALENT



Apply 6.5 – 8.0 g of grease (Bearing grease class 2 grade 3 or equivalent) to the following parts.

- rebound spring
- guide bushing inner surface

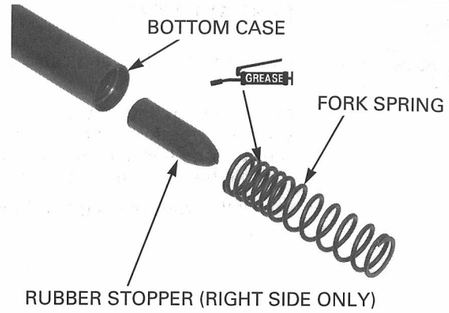


Right side only

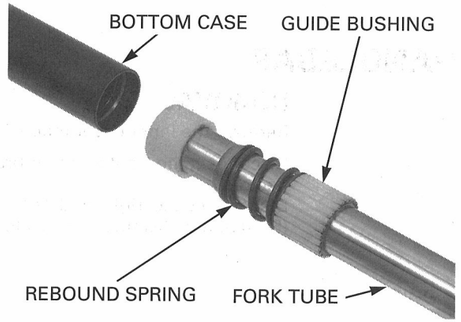
Install the rubber stopper into the bottom case as shown.

Apply grease (Bearing grease class 2 grade 3 or equivalent) to the fork spring tightly wound end.

Install the fork spring with the tapered end facing up.



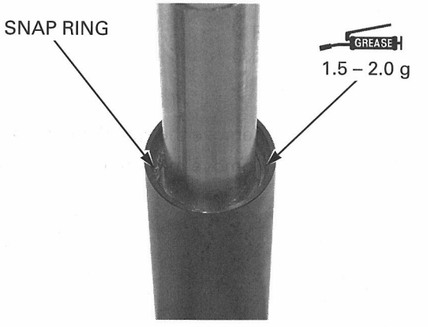
Install the rebound spring and guide bushing to the fork tube.
Install the fork tube into the bottom case.



Press the fork tube into the bottom case until the snap ring groove is visible.

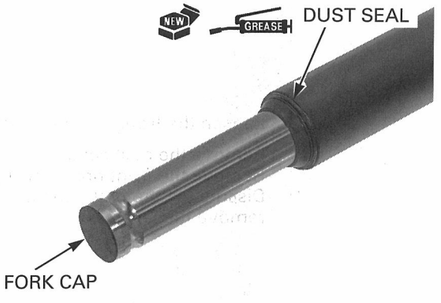
Install the snap ring into the groove in the bottom case.

Fill up the bottom case inside with grease (Bearing grease class 2 grade 3 or equivalent) 1.5 – 2.0 g.



Coat a new dust seal lip with grease (Bearing grease class 2 grade 3 or equivalent) and install it into the bottom case.

Install the fork cap.



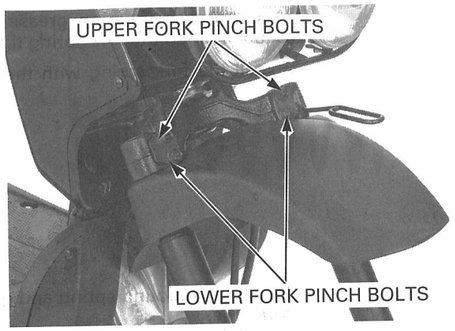
INSTALLATION

Route the cables properly.

Install the set plate and cable guide when they are removed.

Install the fork into the steering stem and align the groove of the fork tube with the upper bolt hole of the stem, then install the upper pinch bolt.
Tighten the fork pinch bolts securely.

Install the front wheel (page 14-9).

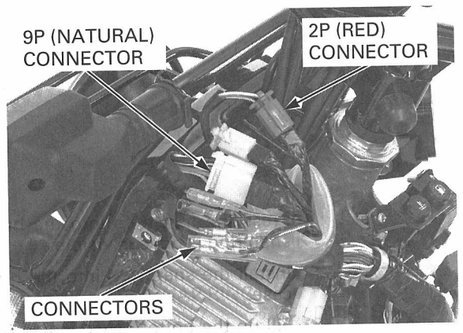


HANDLEBAR

REMOVAL

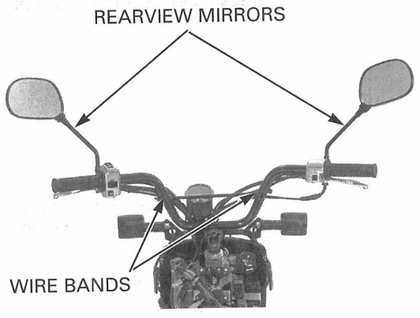
Remove the inner cover (page 3-5).

Disconnect the front and rear brake light switch connectors.
Disconnect the right and left handlebar switch 2P (Red) and 9P (Natural) connectors.



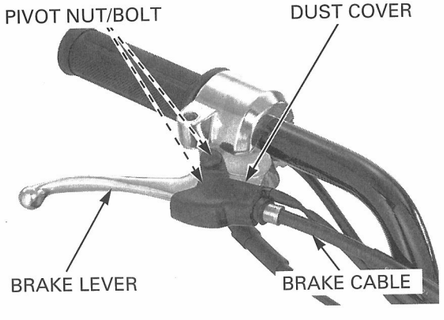
Remove the speedometer (page 19-10).

Remove the wire bands and rearview mirrors.



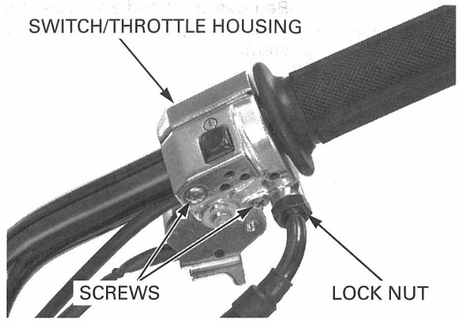
Loosen the front brake adjusting nut.

Remove the dust cover.
Remove the front brake lever pivot nut and bolt.
Disconnect the brake cable from the brake lever and remove the lever.



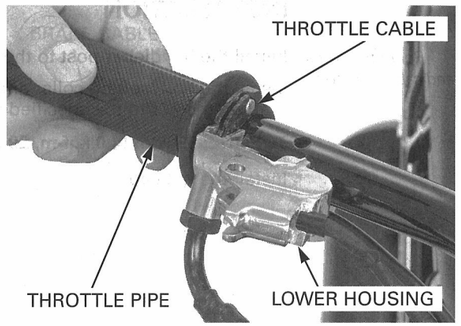
Loosen the throttle cable lock nut.

Remove the screws and right handlebar switch/throttle housing.



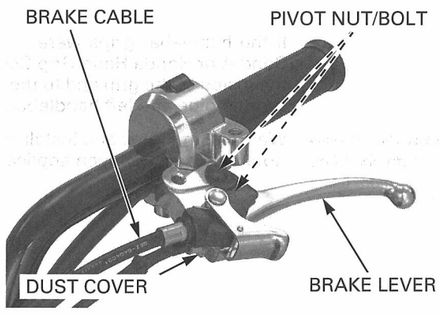
Disconnect the throttle cable from the throttle pipe.

Remove the throttle cable from the lower housing.

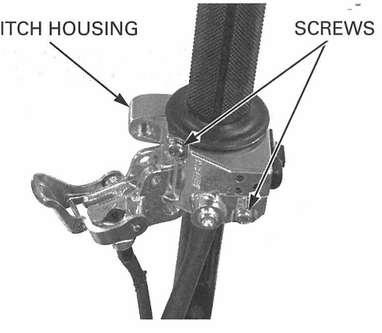


Loosen the rear brake adjusting nut.

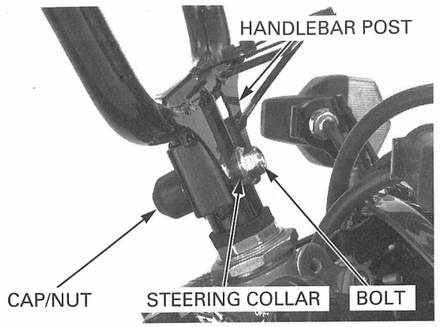
Remove the dust cover.
Remove the rear brake lever pivot nut and bolt.
Disconnect the brake cable from the brake lever and remove the lever.



Remove the screws and left handlebar switch housing.



Remove the handlebar post nut cap, nut, bolt, setting collar and handlebar post from the steering stem.



INSTALLATION

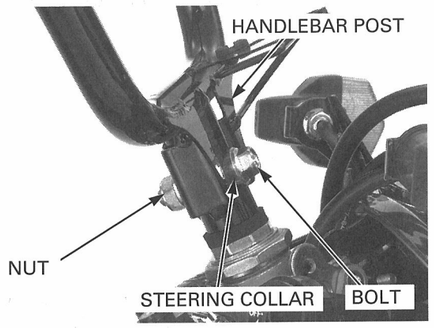
Route the wires and cables properly.

Install the handlebar post to the steering stem.

Install the bolt, setting collar and nut.
Tighten the nut to the specified torque.

TORQUE: 39 N·m (4.0 kgf·m, 29 lbf·ft)

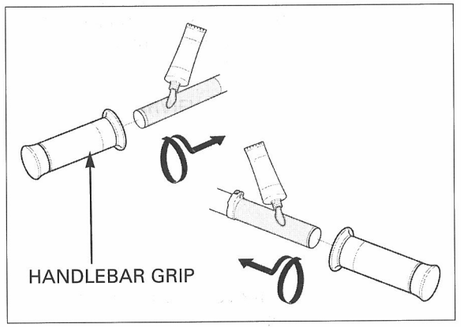
Install the nut cap.



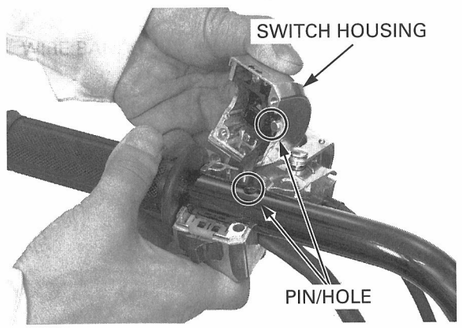
If the handlebar grips were removed, apply Honda Bond A or Honda Hand Grip Cement (U.S.A. only) to the inside of the grip and to the clean surfaces of the throttle pipe and left handlebar.

Allow the adhesive to dry for 1 hour before using.

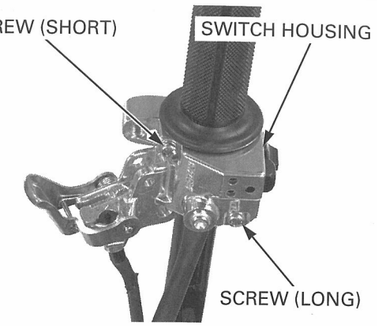
Wait 3 – 5 minutes and install the grip.
Rotate the grip for even application of the adhesive.



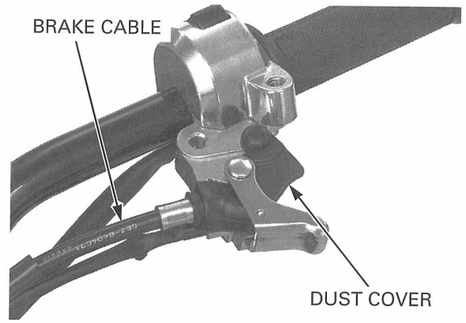
Install the left handlebar switch housing aligning its locating pin with the hole of the handlebar.



Tighten the forward short screw first, then the rear long screw.



Install the brake cable and dust cover as shown.

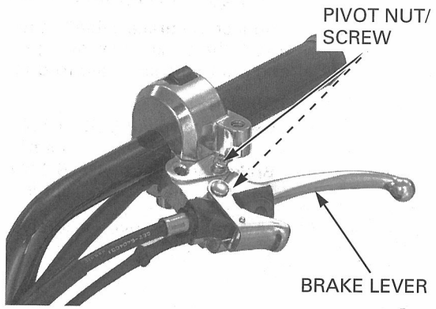


Connect the brake cable to the rear brake lever.
Apply grease to the brake lever pivot bolt sliding surface.
Install the rear brake lever by tightening the pivot bolt and nut to the specified torque.

TORQUE:

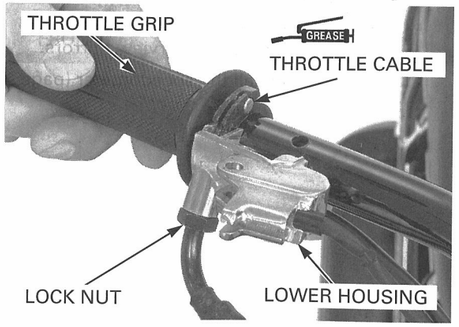
Brake lever pivot bolt:	**1.0 N·m (0.11 kgf·m, 0.8 lbf·ft)**
Brake lever pivot nut:	**5.2 N·m (0.53 kgf·m, 3.8 lbf·ft)**

Install the dust seal securely.

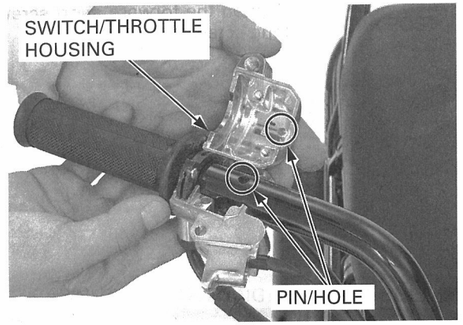


Apply grease to the throttle cable end.
Install the throttle cable to the lower housing.
Lightly tighten the throttle cable lock nut.

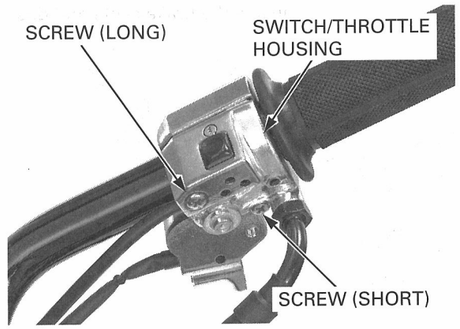
Apply grease to the sliding surface of the throttle pipe.
Install the throttle pipe to the handlebar.
Connect the throttle cable end to the throttle pipe.



Install the right handlebar switch/throttle housing aligning its locating pin with the hole of the handlebar.



Tighten the forward short screw first, then rear long screw.



Apply grease to the pivot screw sliding surface.

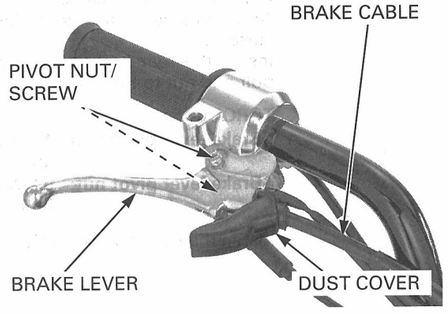
Connect the brake cable to the front brake lever. Install the brake lever by tightening the pivot screw and nut to the specified torque.

TORQUE:

Brake lever pivot bolt: 1.0 N·m (0.11 kgf·m, 0.8 lbf·ft)

Brake lever pivot nut: 5.2 N·m (0.53 kgf·m, 3.8 lbf·ft)

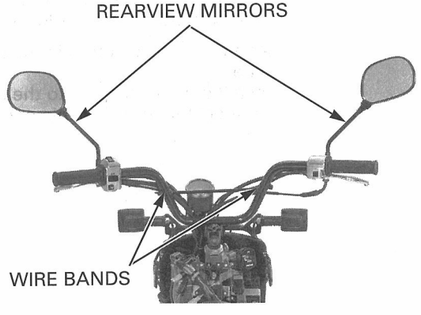
Install the dust cover securely.



Route the wires and cables properly.

Install the wire bands.
Install the rearview mirrors.

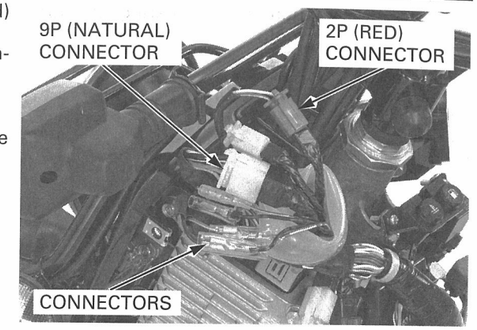
Install the speedometer (page 19-10).



Connect the right and left handlebar switch 2P (Red) and 9P (Natural) connectors.
Connect the front and rear brake light switch connectors.

Install the inner cover (page 3-5).

Adjust the front and rear brake lever free play (page 4-13).
Adjust the throttle grip free play (page 4-4).



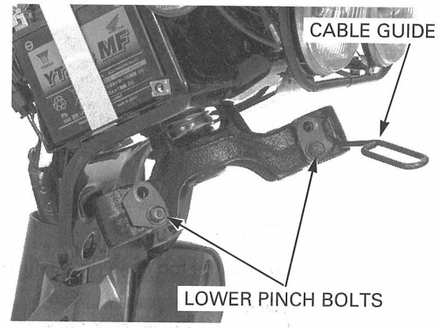
STEERING STEM

REMOVAL

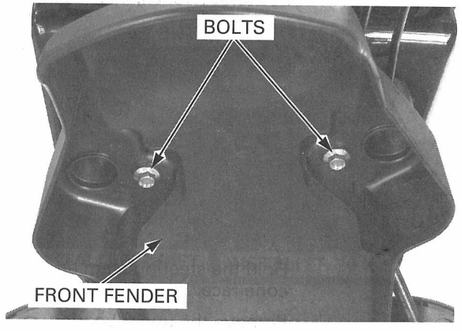
Remove the following:

- Front wheel (page 14-6)
- Fork (page 14-14)
- Handlebar (page 14-18)

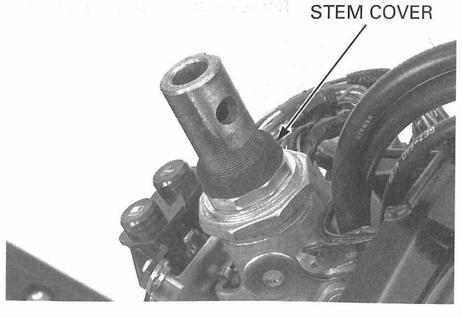
Remove the fork lower pinch bolts and cable guide.



Remove the bolts and front fender.

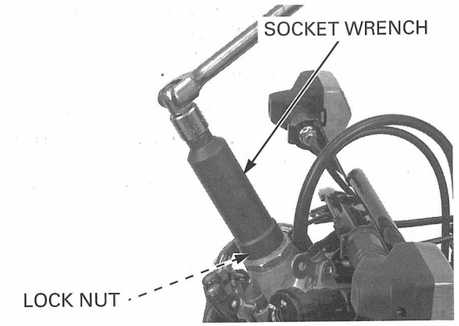


Remove the stem cover.

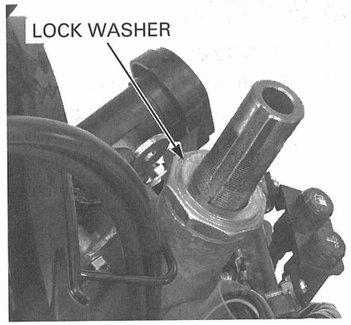


Remove the steering stem lock nut using the special tool.

TOOL:
Socket wrench, 32 mm 07916-KM10000

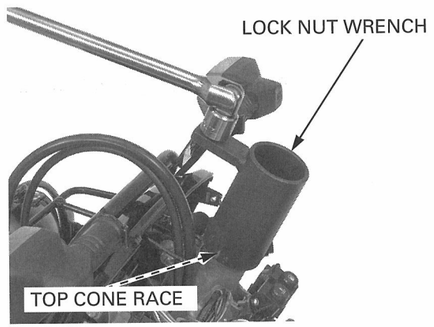


Remove the lock washer.



Loosen the top cone race using the special tool.

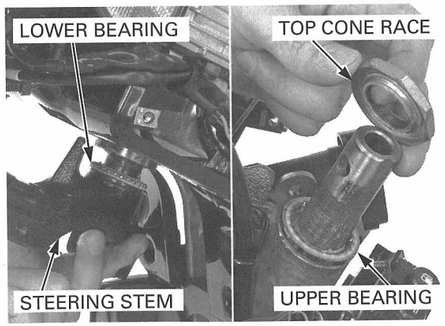
TOOL:
Lock nut wrench, 45 X 54 mm 07SMA-GBC0100



Hold the steering stem and remove the steering top cone race.

Remove the upper bearing.

Remove the steering stem and lower bearing.

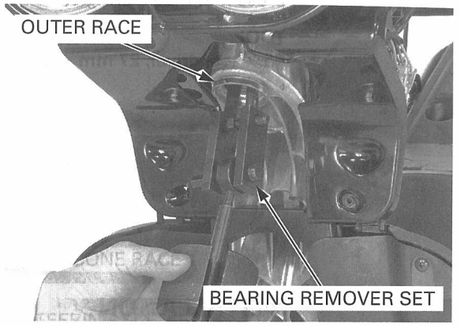


BEARING REPLACEMENT

Always replace the bearings and races as a set

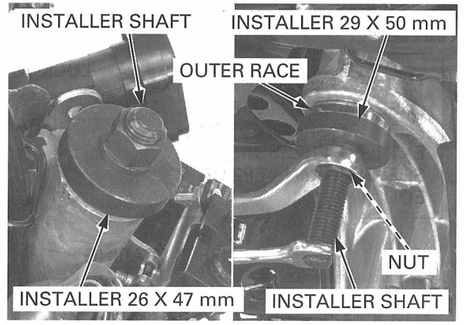
Remove the upper/lower bearing outer races using the special tools.

TOOLS:
Adjustable bearing remover set 07JAC-PH80000
–Remover head 07JAC-PH80100
–Remover shaft 07JAC-PH80200
–Remover weight 07741-0010201



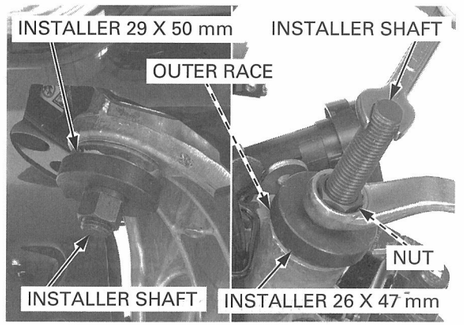
Install a new lower bearing outer race using the special tools as shown.

TOOLS:
Stem race installer, 26 X 47 mm 07XMF-GEE0100
Stem race installer, 29 X 50 mm 07XMF-GEE0200
Installer shaft 07VMF-KZ30200



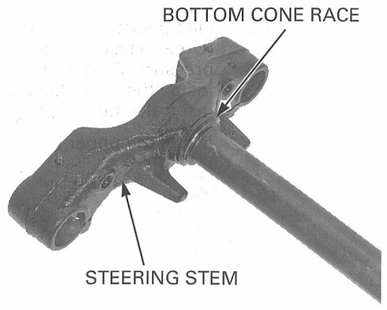
Install a new upper bearing outer race using the special tools as shown.

TOOLS:
Stem race installer, 26 X 47 mm 07XMF-GEE0100
Stem race installer, 29 X 50 mm 07XMF-GEE0200
Installer shaft 07VMF-KZ30200



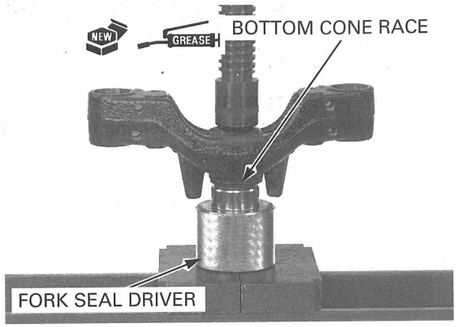
Install the steering stem lock nut onto the steering stem to prevent the threads from being damaged when removing the bottom cone race from the steering stem.

Remove the lower bearing inner race with a chisel or equivalent tool, being careful not to damage the steering stem.



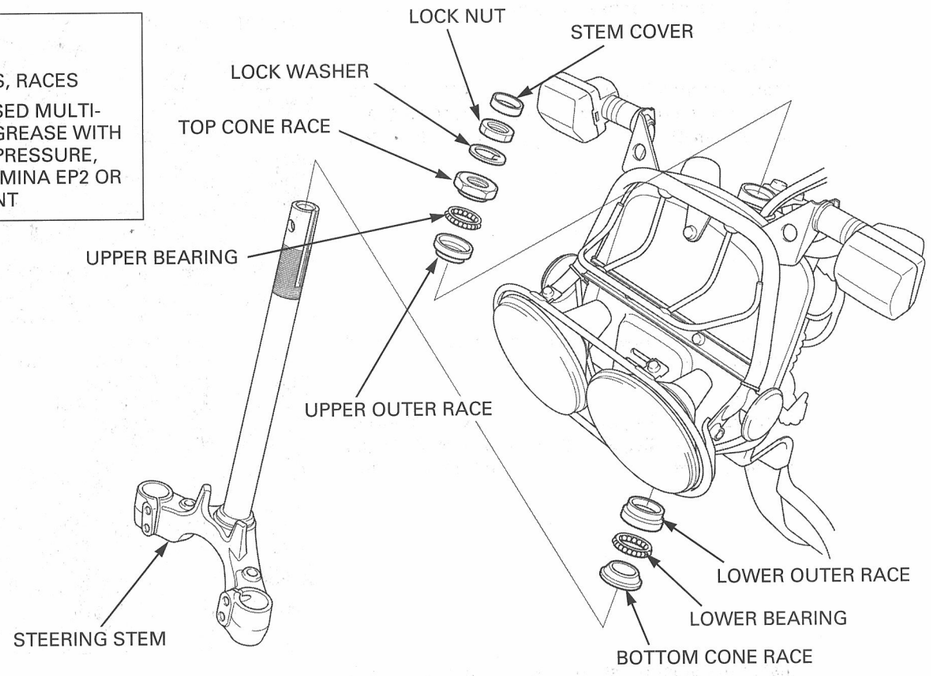
Apply grease to a new lower bearing inner race and press it to the steering stem using the special tool.

TOOL:
Fork seal driver, 27 mm 07947-1180001



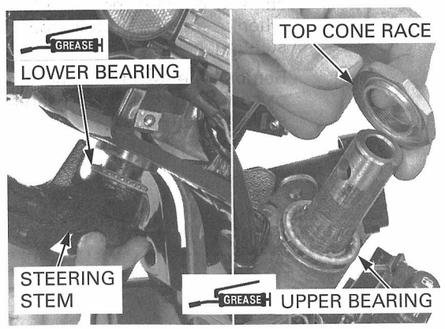
INSTALLATION

GREASE
: BEARINGS, RACES
: UREA BASED MULTI-PURPOSE GREASE WITH EXTREME PRESSURE, SHELL STAMINA EP2 OR EQUIVALENT



Fill up each new bearing and inner race with grease (Urea based multi-purpose grease with extreme pressure, Shell stamina EP2 or equivalent) 3 – 5 g.
Install the lower bearing onto the stem.
Insert the steering stem into the steering head pipe.

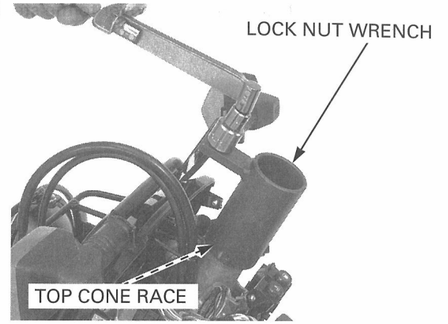
Install the upper bearing and top cone race.



Tighten the steering top cone race to the specified torque using the special tool.

TOOL:
Lock nut wrench, 45 X 54 mm 07SMA-GBC0100

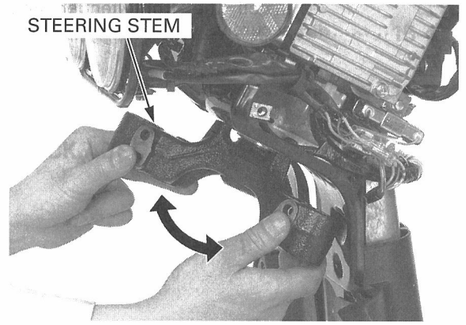
TORQUE: 11 N·m (1.1 kgf·m, 8 lbf·ft)



Turn the steering stem lock-to-lock several times to seat the bearing.

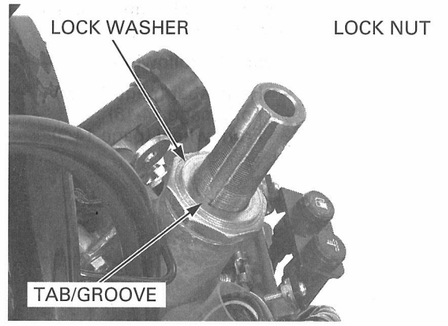
Temporarily loosen the steering stem top cone race.

Tighten the top cone race fully by hand, after loosening the top cone race 45°.



Install the lock washer aligning its tab to the groove on the steering stem.

Install the lock nut.



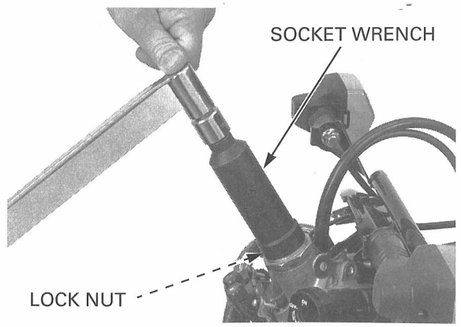
Tighten the steering stem lock nut to the specified torque using the special tool.

TOOL:
Socket wrench, 32 mm 07916-KM10000

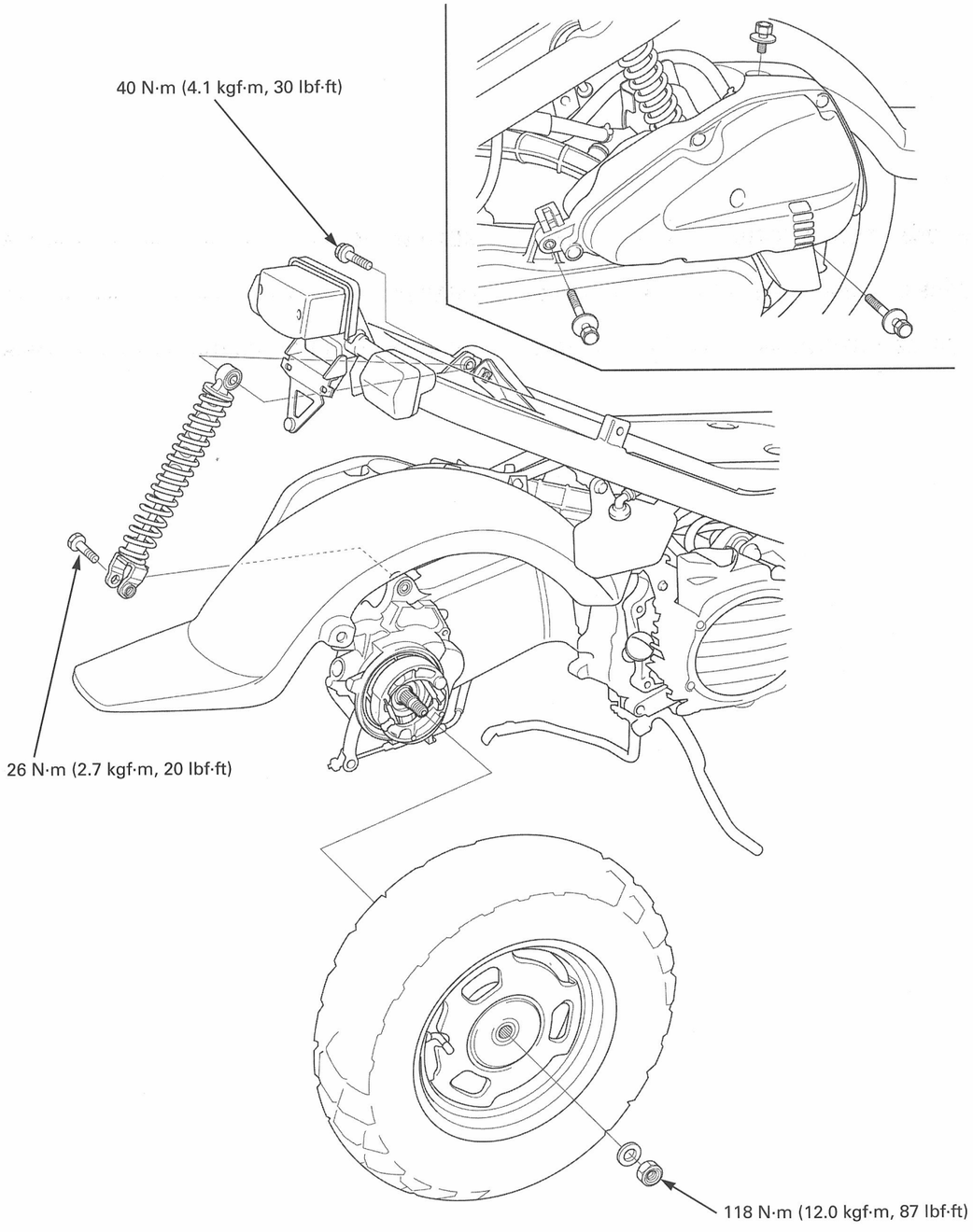
TORQUE: 69 N·m (7.0 kgf·m, 51 lbf·ft)

Turn the steering stem lock-to-lock several times to seat the bearing.

Make sure the steering stem moves smoothly without play or binding.



COMPONENT LOCATIONS



SERVICE INFORMATION

GENERAL

⚠ CAUTION

Frequent inhalation of brake shoe dust, regardless of material composition could be hazardous to your health.
- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner.

- Use only tires marked "TUBELESS" and tubeless valve stems on rims marked "TUBELESS TIRE APPLICABLE".
- Use genuine Honda replacement bolts for all suspension pivots and mounting points.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT
Minimum tire tread depth		–	0.8 (0.03)
Cold tire pressure		175 kPa (1.75 kgf/cm², 25 psi)	–
Wheel rim runout	Radial	–	2.0 (0.08)
	Axial	–	2.0 (0.08)
Rear brake lever free play		10 – 20 (3/8 – 13/16)	–
Brake drum I.D.		95.0 (3.74)	95.5 (3.76)

TORQUE VALUES

Rear axle nut		118 N·m (12.0 kgf·m, 87 lbf·ft)	Apply oil to the threads/U-nut
Rear brake arm bolt		5.0 N·m (0.51 kgf·m, 3.7 lbf·ft)	ALOC bolt
Rear shock absorber mounting bolt	(UPPER)	40 N·m (4.1 kgf·m, 30 lbf·ft)	
	(LOWER)	26 N·m (2.7 kgf·m, 20 lbf·ft)	

TROUBLESHOOTING

Rear wheel wobbles
- Bent rim
- Faulty tire
- Axle nut and/or engine mounting bolt not tightened properly
- Loose or worn final gear shaft bearing
- Insufficient tire pressure
- Unbalanced tire and wheel

Soft suspension
- Weak rear shock absorber spring
- Oil leakage from damper unit
- Low tire pressure

Stiff suspension
- Bent damper rod
- High tire pressure

Rear suspension noisy
- Loose mounting fasteners
- Faulty shock absorber
- Weak rear suspension bushings

Poor brake performance
- Incorrect adjustment of rear brake lever
- Contaminated brake shoes
- Worn brake shoes
- Worn brake cam
- Worn brake drum
- Improperly engaged brake arm serrations

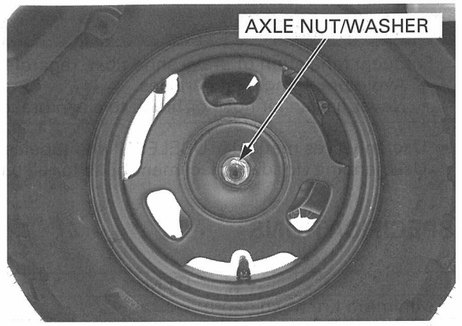
REAR WHEEL

REMOVAL

Place the scooter on its center stand.

Remove the muffler (page 3-9).

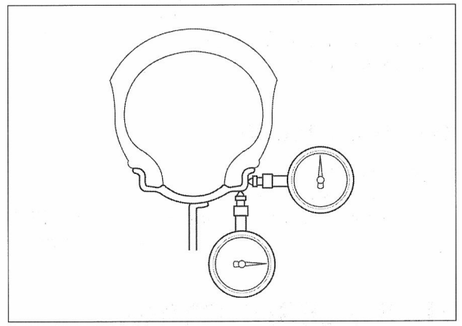
Remove the rear axle nut, washer and rear wheel.



INSPECTION

Check the wheel rim runout using dial indicators.
Actual runout is 1/2 the total indicator readings.

SERVICE LIMITS:
Radial: 2.0 mm (0.08 in)
Axial: 2.0 mm (0.08 in)



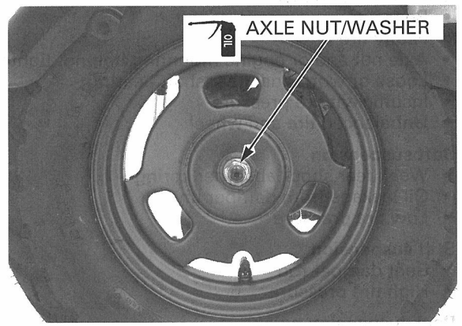
INSTALLATION

Install the rear wheel onto the final gear shaft, aligning the spline.
Install the washer onto the final gear shaft.

Apply oil to the threads and seating surface of the rear axle nut.
Tighten the rear axle nut to the specified torque.

TORQUE: 118 N·m (12.0 kgf·m, 87 lbf·ft)

Install the muffler (page 3-9).



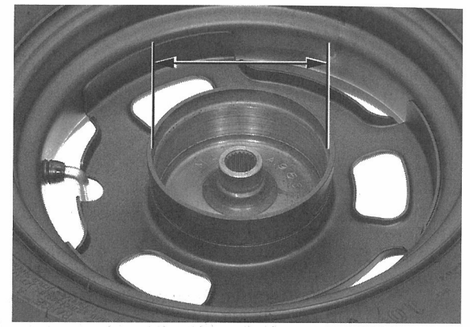
REAR BRAKE

Remove the rear wheel (page 15-4).

INSPECTION

Measure the rear brake drum I.D.

SERVICE LIMIT: 95.5 mm (3.76 in)

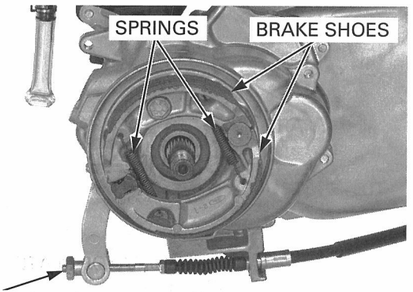


DISASSEMBLY

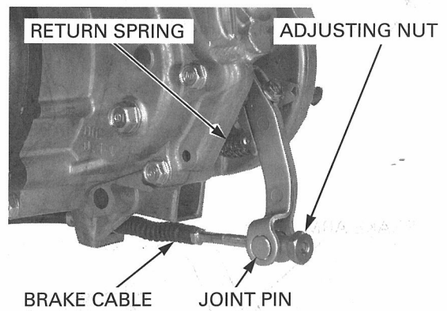
NOTE:

- Always replace the brake shoes as a set.
- Mark all parts during disassembly so they can be placed back in the original locations.

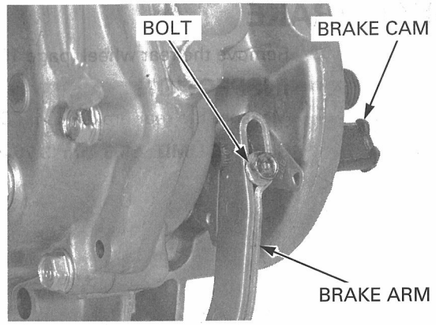
Loosen the rear brake adjusting nut.
Remove the brake shoes and springs by spreading the brake shoes.



Remove the adjusting nut and brake cable from the joint pin.
Remove the joint pin and return spring.

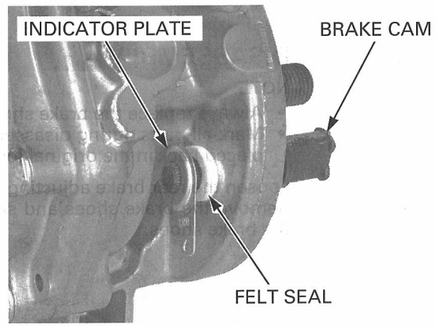


Remove the brake arm bolt.
Remove the brake arm while pulling the brake cam out.

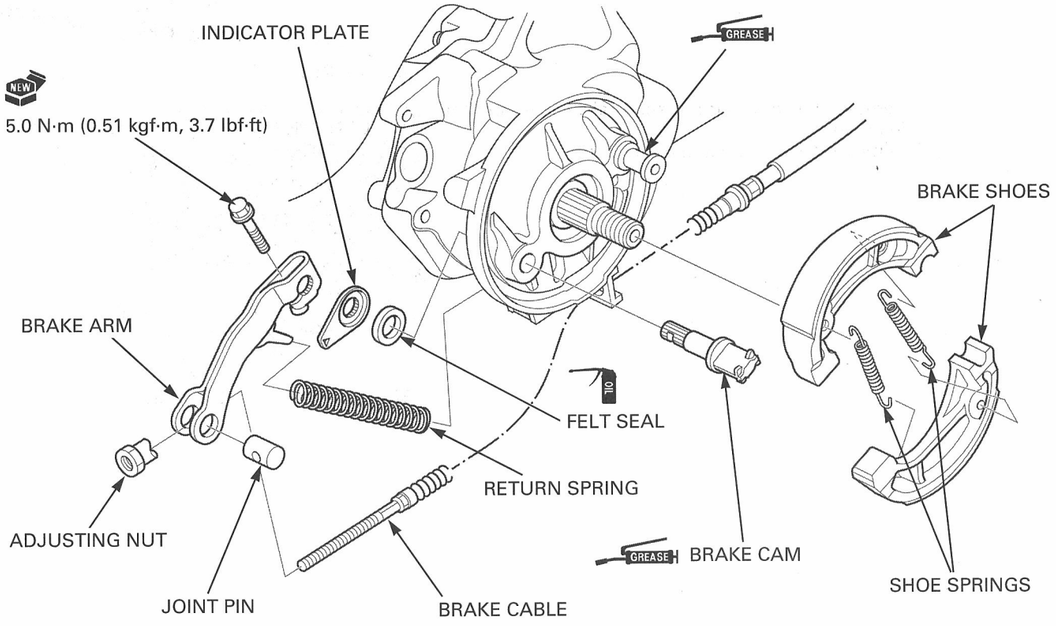


Remove the wear indicator plate and felt seal.

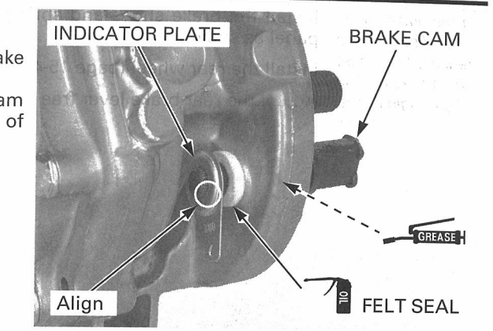
Remove the brake cam from the brake panel.



ASSEMBLY

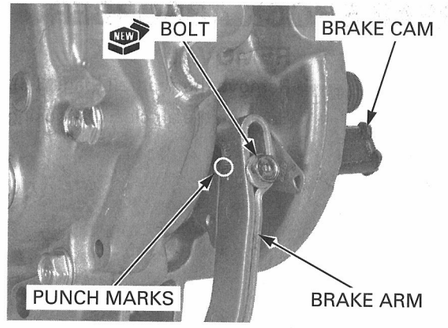


Apply grease to the brake cam sliding surface.
Install the brake cam into the brake panel.
Apply oil to the felt seal and install it onto the brake cam.
Install the wear indicator plate onto the brake cam by aligning its wide tooth with the wide groove of the brake cam.

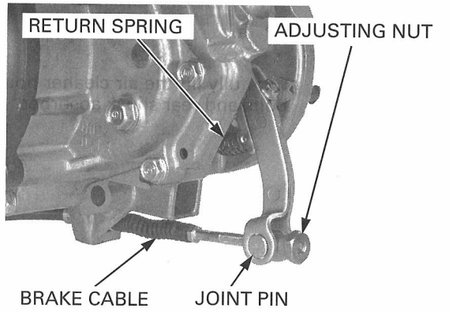


Install the brake arm by aligning the punch marks on the brake arm and brake cam.
Install a new brake arm bolt and tighten it to the specified torque.

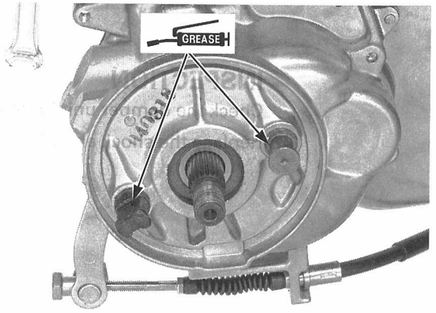
TORQUE: 5.0 N·m (0.51 kgf·m, 3.7 lbf·ft)



Install the return spring between the belt case and brake arm.
Install the joint pin on the brake arm.
Connect the brake cable to the joint pin and install the adjusting nut.

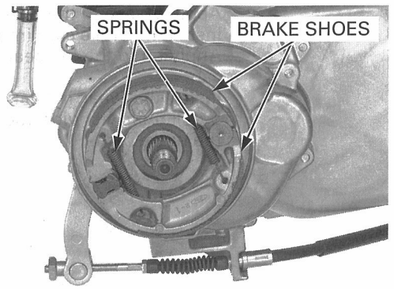


Apply grease to the anchor pin and brake cam sliding surfaces.



If the brake shoes and springs are reused, they must be placed back in their original locations.

Install the brake shoes and springs onto the brake panel as shown.



Install the rear wheel (page 15-4).

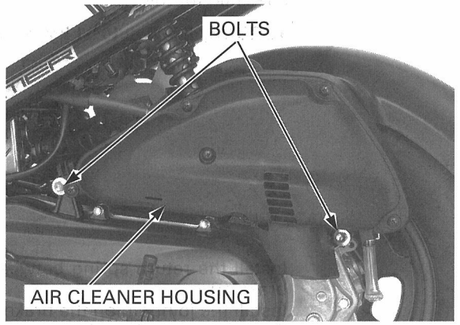
Adjust the rear brake lever free play (page 4-13).

REAR SHOCK ABSORBER

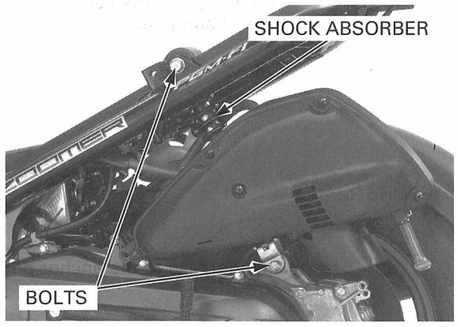
REMOVAL

Remove the seat rail (page 3-5).

Remove the air cleaner housing bolts.



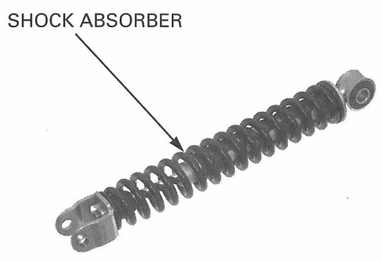
Carefully lift the air cleaner housing up, remove the bolts and rear shock absorber.



INSPECTION

Check the damper unit for leakage or other damage.

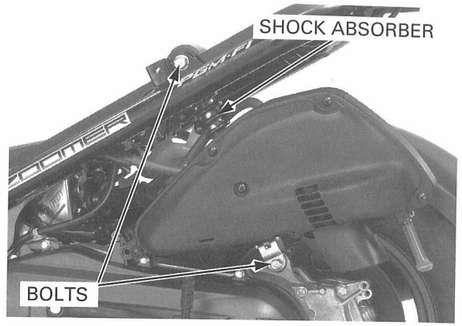
Replace the shock absorber assembly if necessary.



INSTALLATION

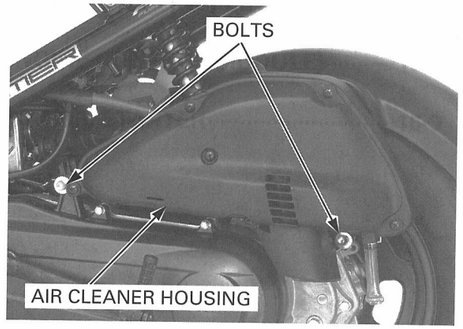
Install the rear shock absorber and tighten the bolts to the specified torque.

TORQUE: UPPER: 40 N·m (4.1 kgf·m, 30 lbf·ft)
LOWER: 26 N·m (2.7 kgf·m, 20 lbf·ft)



Install and tighten the air cleaner housing bolts securely.

Install the seat rail (page 3-5).

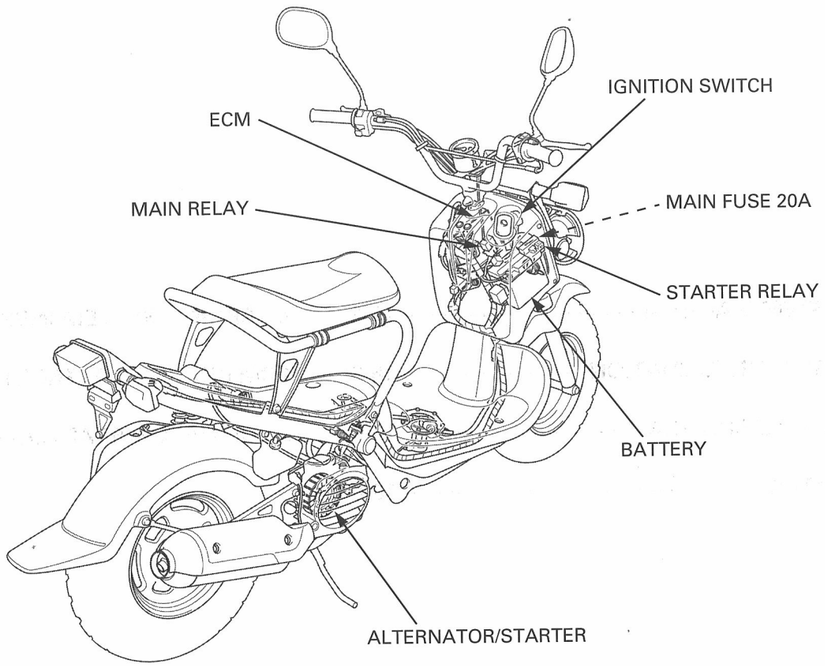


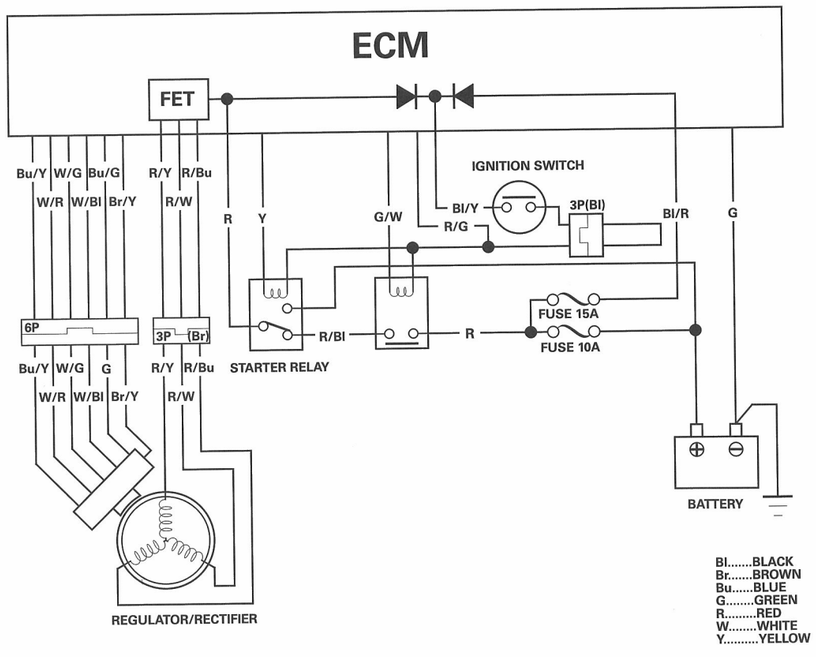
MEMO

16. BATTERY/CHARGING SYSTEM

SYSTEM DIAGRAM 16-2
SERVICE INFORMATION 16-3
TROUBLESHOOTING 16-5
BATTERY 16-6
CHARGING SYSTEM INSPECTION 16-7
ECM (ENGINE CONTROL MODULE) 16-8
ALTERNATOR/STARTER 16-9

SYSTEM DIAGRAM





SERVICE INFORMATION

GENERAL

⚠WARNING

- The battery gives off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging.
- The battery contains sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield.
  - If electrolyte gets on your skin, flush with water.
  - If electrolyte gets in your eyes, flush with water for at least 15 minutes and call a physician immediately.
- Electrolyte is poisonous.
  - If swallowed, drink large quantities of water or milk and call your local Poison Control Center or a call a physician immediately.

NOTICE

- *Always turn off the ignition switch before disconnecting any electrical component.*
- *Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is in the "ON" position and current is present.*

- For extended storage, remove the battery, give it a full charge, and store it in a cool, dry space.
- For a battery remaining in a stored scooter, disconnect the negative battery cable from the battery.
- The battery sealing caps should not be removed. Attempting to remove the sealing caps from the cells may damage the battery.
- The maintenance free (MF) battery must be replaced when it reaches the end of its service life.
- The battery can be damaged if overcharged or undercharged, or if left to discharge for long period. These same conditions contribute to shortening the "life span" of the battery. Even under normal use, the performance of the battery deteriorates after 2–3 years.
- Battery voltage may recover after battery charging, but under heavy load, battery voltage will drop quickly and eventually die out. For this reason, the charging system is often suspected as the problem. Battery overcharging often results from problems in the battery itself, which may appear to be an overcharging symptom. If one of the battery cells is shorted and battery voltage does not increase, the regulator/rectifier in the ECM supplies excess voltage to the battery. Under these conditions, the electrolyte level goes down quickly.
- Before troubleshooting the charging system, check for proper use and maintenance of the battery. Check if the battery is frequently under heavy load, such as having the turn signal light and taillight on for long periods of time without riding the scooter.
- The battery will self-discharge when the scooter is not in use. For this reason, charge the battery every 2 weeks to prevent sulfation from occurring.
- Filling a new battery with electrolyte will produce some voltage, but in order to achieve its maximum performance, always charge the battery. Also, the battery life is lengthened when it is initially charged.
- When checking the charging system, always follow the steps in the troubleshooting flow chart (page 16-5).
- This scooter has alternator/starter. The alternator/starter has alternator and starter motor functions.
- The regulator/rectifier is located in the ECM.
- The alternator/starter service may be done with the engine in the frame. For alternator/starter removal/installation, See page 12-4.

BATTERY CHARGING

- This model comes with a maintenance free (MF) battery. Remember the following about MF batteries
  - Use only the electrolyte that comes with the battery.
  - Use all of the electrolyte.
  - Seal the battery properly.
  - Never open the seals after installation.
- For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.

BATTERY TESTING

Refer to the battery tester's Operation Manual for the recommended battery testing procedure. The recommended battery tester puts a "load" on the battery so the actual battery condition of the load can be measured.

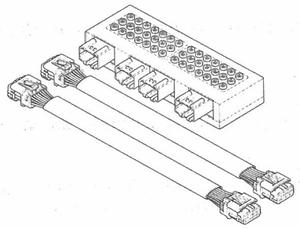
Recommended battery tester **BM-210 or BATTERY MATE or equivalent**

SPECIFICATIONS

ITEM			SPECIFICATION
Battery	Capacity		12V - 6 Ah
	Current leakage		0.1 mA max.
	Voltage (20° C/68° F)	Fully charged	13.0 – 13.2 V
		Needs charging	Below 12.3 V
	Charging current	Normal	0.6 A/5 – 10 h
		Quick	3A/1h
Alternator	Capacity		210 W/5,000 min^{-1} (rpm)
	Charging coil resistance (20° C/68° F)		0.05 – 0.2 Ω

TOOLS

ECM test harness
070MZ-GEV0100



TROUBLESHOOTING

BATTERY IS DAMAGED OR WEAK

1. **BATTERY TEST**

   Remove the battery (page 16-6).

   Check the battery condition using the recommended battery tester.

   RECOMMENDED BATTERY TESTER:
   BM210 or BATTERY MATE or equivalent

   Is the battery in good condition?

   NO – Faulty battery.

   YES – GO TO STEP 2.

2. **CURRENT LEAKAGE TEST**

   Install the battery (page 16-6).

   Check the battery current leakage test (Leak test; page 16-7).

   Is the current leakage below 0.1 mA?

   YES – GO TO STEP 3.

   NO – Short circuit in wire harness.

3. **CHARGING VOLTAGE INSPECTION**

   Measure and record the battery voltage using a digital multimeter (page 16-6).

   Start the engine.

   Measure the charging voltage (page 16-8).

   Compare the measurement to the result of the following calculation.

   STANDARD:
   Measured battery voltage < Measured charging voltage < 15.5 V

   Is the measured charging voltage within the standard voltage?

   YES – Faulty battery.

   NO – GO TO STEP 4.

4. **ALTERNATOR CHARGING COIL INSPECTION**

   Check the alternator charging coil (page 16-9).

   Is the alternator charging coil resistance within 0.05 – 0.2 Ω (20°C/68°F)?

   NO – Faulty charging coil.

   YES – GO TO STEP 5.

5. **CHARGING/STARTER SYSTEM INSPECTION**

   Inspect the charging/starter system on the ECM side (page 16-8).

   Are the results of checked continuity and resistance correct?

   YES –
   - Faulty ECM.
   - Faulty main relay (page 6-66) or related circuit.
   - Faulty starter relay (page 18-6).

   NO –
   - Open or short circuit in wire harness.
   - Poorly connected connector.

BATTERY

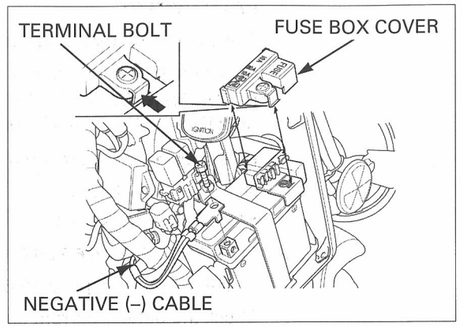
REMOVAL/INSTALLATION

Turn the ignition switch to "OFF".

Disconnect the battery negative (–) cable by removing the terminal bolt.

Remove the inner cover (page 3-5).

Remove the fuse box cover by releasing its hook.



Disconnect the fuse box/battery positive (+) cable by removing the terminal bolt.

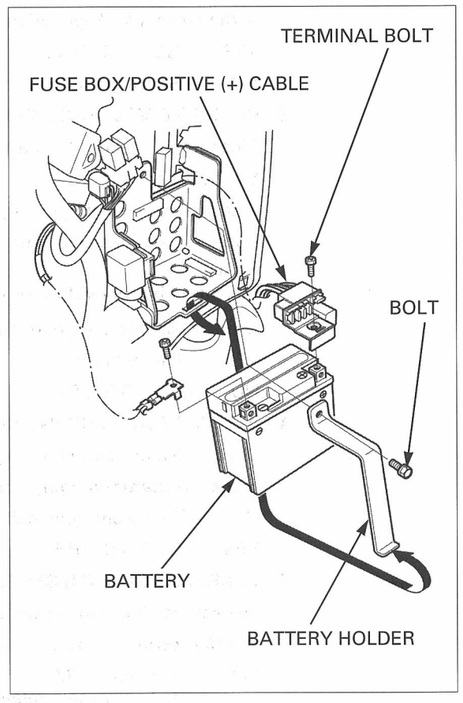
Remove the bolt and battery holder.

Remove the battery.

Install the removed parts in the reverse order of removal.

NOTE:

- Connect the fuse box/positive (+) cable first, then connect the negative (–) cable.
- After connecting the battery cables, coat the terminals with dielectric grease.



VOLTAGE INSPECTION

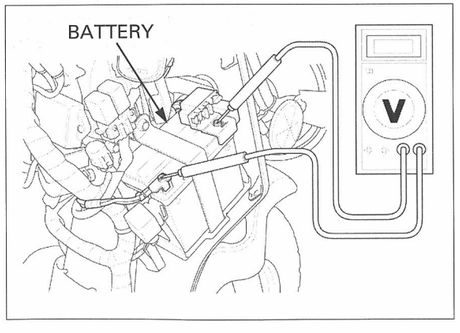
Remove the fuse box cover (page 16-6).

Measure the battery voltage using a commercially available digital multimeter.

VOLTAGE (20° C/68° F):
Fully charged: 13.0 – 13.2 V
Under charged: Below 12.3 V

NOTE:

- When measuring the battery voltage after charging, leave it for at least 30 minutes, or the accurate results cannot be obtained because the battery voltage fluctuates just after charging.



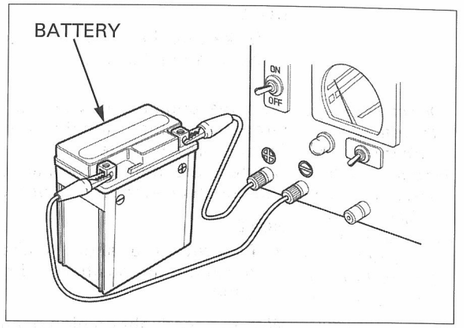
BATTERY CHARGING

Remove the battery (page 16-6).

Turn power ON/OFF at the charger, not at the battery terminals.

Connect the charger positive (+) cable to the battery positive (+) terminal.
Connect the charger negative (–) cable to the battery negative (–) terminal.

- Quick-charging should only be done in an emergency; slow charging is preferred.
- For battery charging, do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.



CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE TEST

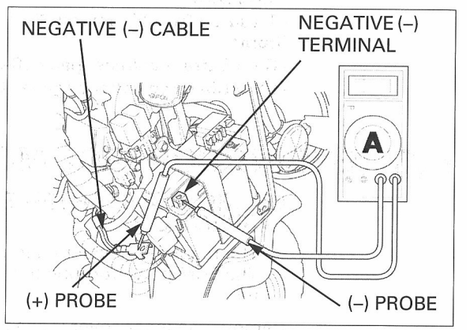
Turn the ignition switch to "OFF" and disconnect the negative (–) cable from the battery.
Connect the ammeter (+) probe to the negative (–) cable and the ammeter (–) probe to the battery negative (–) terminal.
With the ignition switch turned to "OFF", measure the current leakage.

NOTE:

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch to "ON". A sudden surge of current switch may blow out the fuse in the tester.

SPECIFIED CURRENT LEAKAGE: 0.1 mA max.

If current leakage exceeds the specified value, a shorted circuit is the probable cause.
Locate the short by disconnecting connections one by one and measuring the current.



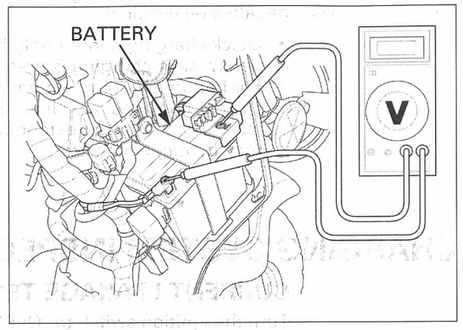
CHARGING VOLTAGE INSPECTION

NOTE:

- Make sure the battery is in good condition before performing this test.

Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.

Start the engine and warm it up to the operating temperature; then stop the engine.
Connect a tachometer.
Connect the multimeter between the positive (+) and negative (–) terminals of the battery.



NOTE:

- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.

With the headlight on high beam, restart the engine. Measure the voltage on the multimeter when the engine runs at 5,000 min^{-1} (rpm).

STANDARD:
Measured BV < Measured CV < 15.5 V at 5,000 min^{-1} (rpm)
–BV = Battery voltage (page 16-6)
–CV = Charging voltage (page 16-8)

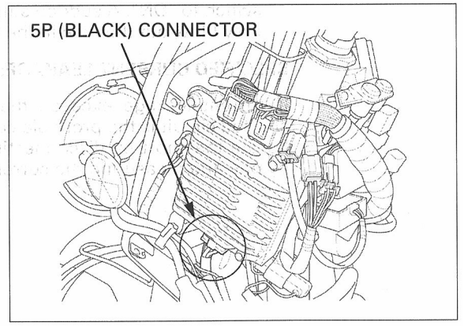
ECM (ENGINE CONTROL MODULE)

CHARGING/STARTER SYSTEM INSPECTION

- The regulator/rectifier built-in the ECM.
- The ECM power/ground line inspection, see page 6-67.

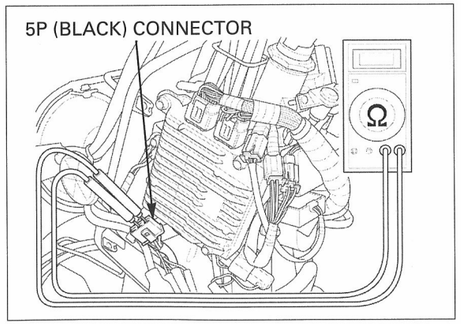
Remove the inner cover (page 3-5).

Disconnect the ECM 5P (Black) connector, and check it for loose connector or corroded terminals.



Measure the charging coil resistance between the three terminals (Red/Yellow, Red/White and Red/Blue) of the 5P (Black) connector wire harness side.

STANDARD: 0.05 – 0.2 Ω (20° C/68° F)



Check for continuity between the three terminals (Red/Yellow, Red/White and Red/Blue) of the 5P (Black) connector wire harness side and ground. There should be no continuity.

If readings are far beyond the standard, or if any wire has continuity to ground, check the wire harness for open circuit.

IGNITION SWITCH CIRCUIT INSPECTION

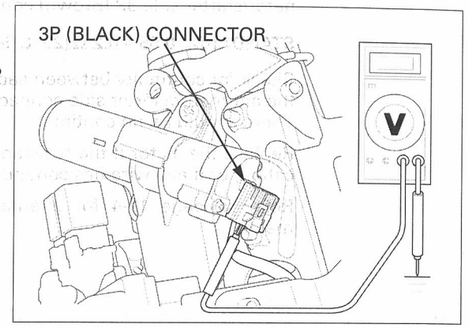
Remove the front cover (page 3-6).

Disconnect the ignition switch 3P (Black) connector.

Measure the voltage between the ignition switch 3P (Black) connector and ground.

CONNECTION: Red/Blue – Ground
STANDARD: Battery voltage

There should be battery voltage.

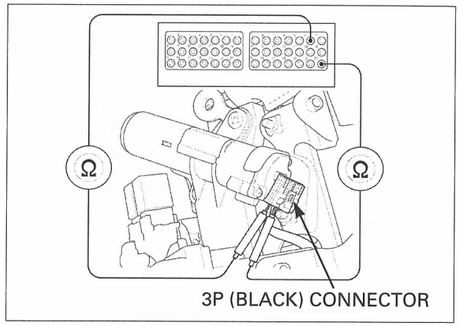


If the voltage is out of specification, connect the test harness to the ECM 21P (Black) and 21P (Gray) connectors (page 6-10).

TOOL:
ECM test harness 070MZ-GEV0100

Check for continuity between the test harness and ignition switch 3P (Black) connector of the wire harness side.

CONNECTION: A21 – Red/Blue
A6 – Red/Green



If there is continuity, check for ignition switch (page 19-16).

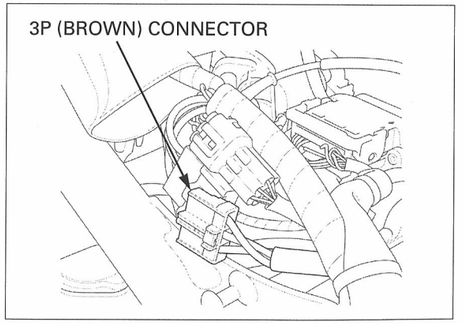
If there is no continuity, check the wire harness for open circuit.

ALTERNATOR/STARTER

CHARGING COIL INSPECTION

Remove the floor step (page 3-7).

Disconnect the alternator/starter 3P (Brown) connector.



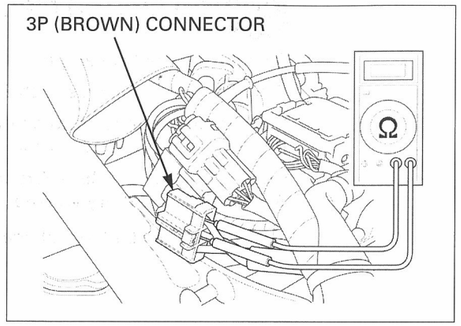
Measure the resistance between the Red/Yellow, Red/White and Red/Blue wire terminals of the alternator/starter side 3P (Brown) connector.

STANDARD: 0.05 – 0.2 Ω (20° C/68° F)

Check for continuity between each wire terminals of the alternator/starter side connector and ground. There should be no continuity.

Replace the stator if the resistance is out of specification, or if any wire has continuity to ground.

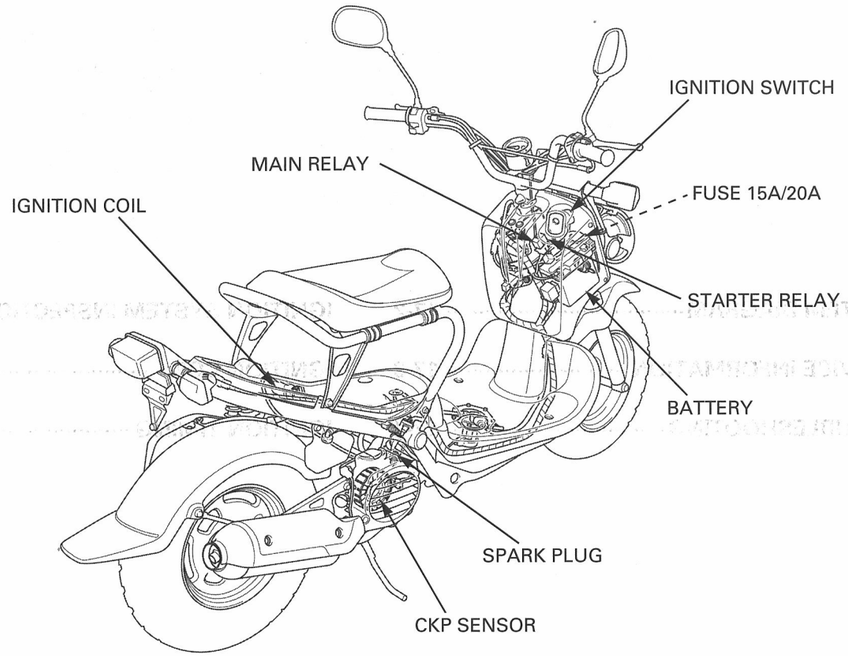
Refer to page 12-4 for alternator/starter replacement.

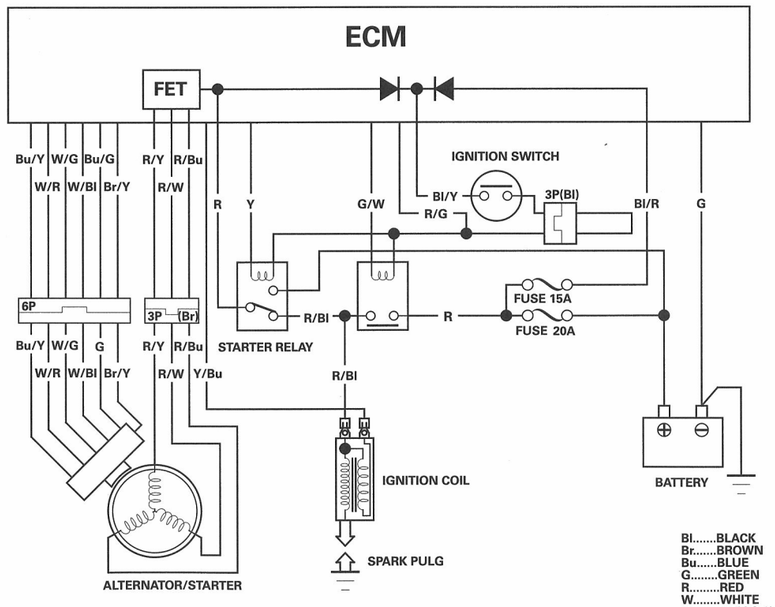


17. IGNITION SYSTEM

SYSTEM DIAGRAM 17-2
SERVICE INFORMATION 17-3
TROUBLESHOOTING 17-4
IGNITION SYSTEM INSPECTION 17-5
IGNITION COIL 17-7
IGNITION TIMING 17-8

SYSTEM DIAGRAM





SERVICE INFORMATION

GENERAL

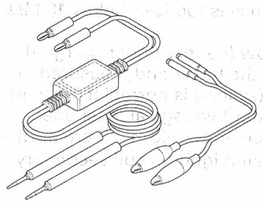
- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is turned to "ON" and current is present.
- When servicing the ignition system, always follow the steps in the troubleshooting sequence on (page 17-4).
- The ignition timing cannot be adjusted since the Engine Control Module (ECM) is factory preset.
- The ECM may be damaged if dropped. Also, if the connector is disconnected when current is flowing, the excessive voltage may damage the ECM. Always turn the ignition switch to "OFF" before servicing.
- A faulty ignition system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Although the engine control module is controlling ignition timing according to engine speed, ignition timing is assisted also with the signal from the throttle position sensor and ECT sensor.
- Use a spark plug of the correct heat range. Using a spark plug with an incorrect heat range can damage the engine.
- For ignition switch and ECT sensor inspection, refer to page 19-16 and page 19-13.
- For ignition pulse generator (alternator stator) removal/installation, refer to page 12-4.
- When inspecting the spark test or ignition coil primary peak voltage, hold the throttle grip fully opened position so that the fuel injection stops to inject.

SPECIFICATION

ITEM		SPECIFICATIONS
Spark plug	Standard	ER8EH-N (NGK)
Spark plug gap		0.60 – 0.70 mm (0.024 – 0.028 in)
Ignition coil peak voltage		100 V minimum
Ignition timing ("F" mark)		15° BTDC at 2,000 min^{-1} (rpm)

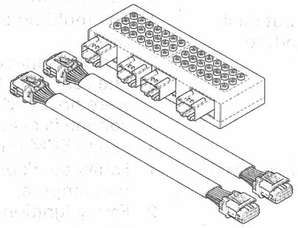
TOOLS

Peak voltage adaptor
07HGJ-0020100



with commercially available digital multimeter (impedance 10 MΩ/DCV minimum)

ECM test harness
070MZ-GEV0100



TROUBLESHOOTING

- Inspect the following before diagnosing the system.
  - Faulty spark plug
  - Loose spark plug cap or spark plug wire connection
  - Water got into the spark plug cap (leaking the ignition coil secondary voltage)
- Temporarily exchange the ignition coil with the other good one and perform the spark test. If there is spark, the exchanged ignition coil is faulty.

No spark at plug

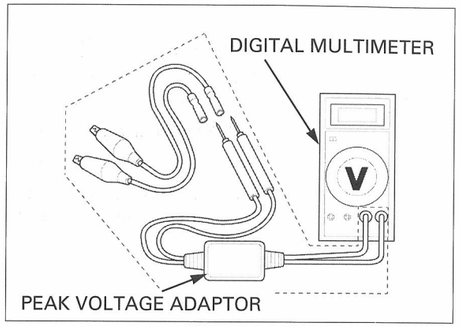
Unusual condition		Probable cause (check in numerical order)
Ignition coil primary voltage	No initial voltage with ignition switch "ON". (Other electrical components are normal)	1. Faulty main relay. 2. An open circuit in Red/Black wire between the main relay and ignition coil. 3. Loose or poor contact of the ignition coil primary wire terminal, or an open circuit in primary coil. 4. Faulty ECM (in case when above No. 1 – 3 are normal).
	Initial voltage is normal, but it drops down to 2 - 4 V while cranking the engine.	1. Incorrect peak voltage adapter connections. (System is normal if measured voltage is over the specifications with reverse connections). 2. Battery is under charged. (Voltage drops largely when the engine is started.) 3. No voltage between the Red (+) and body ground (–) at the ECM 5P (Black) connector or loosen ECM connection. 4. An open circuit or loose connection in Green wire. 5. An open circuit or loose connection in Yellow/Blue wire between the ignition coil and ECM. 6. Short circuit in ignition coil primary coil. 7. Faulty CKP sensor. 8. Faulty ECM (in case when above No.1 – 7 are normal).
	Initial voltage is normal, but no peak voltage while cranking the engine.	1. Faulty peak voltage adaptor connection. 2. Faulty peak voltage adaptor. 3. Faulty ECM (in case when above No. 1, 2 are normal).
	Initial voltage is normal, but peak voltage is lower than standard value.	1. The multimeter impedance is too low; below 10 MΩ/DCV. 2. Cranking speed is too low (battery under-charged) 3. The sampling timing of the tester and measured pulse were not synchronized (system is normal if measured voltage is over the standard voltage at least one). 4. Faulty ECM (in case when above No. 1 – 3 are normal).
	Initial and peak voltage are normal, but does not spark.	1. Faulty spark plug or leaking ignition coil secondary current ampere. 2. Faulty ignition coil

IGNITION SYSTEM INSPECTION

NOTE:
- If there is no spark at the plug, check all connections for loose or poor contact before measuring the peak voltage.
- Use a commercially available digital multimeter (impedance 10 MΩ/DCV minimum).
- The display value differs depending upon the internal impedance of the multimeter.

Connect the peak voltage adapter to the digital multimeter, or use the peak voltage tester.

TOOLS:
Imrie diagnostic tester (model 625) or
Peak voltage adaptor 07HGJ-0020100
with commercially available digital multimeter
(impedance 10 MΩ/DCV minimum)

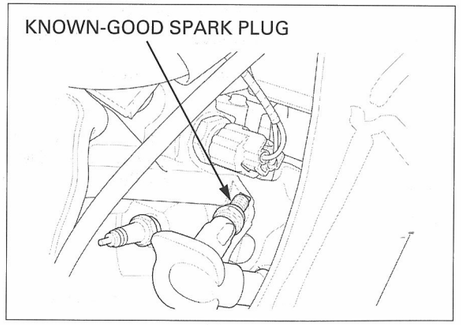


IGNITION COIL PRIMARY PEAK VOLTAGE

NOTE:
- Check all system connections before inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check cylinder compression and check that the spark plug is installed correctly.

Remove the floor step (page 3-7).

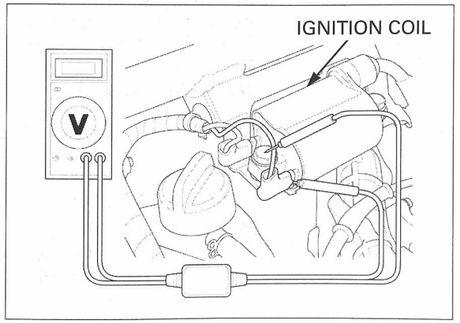
Disconnect the spark plug cap from the spark plug. Connect a known-good spark plug to the spark plug cap and ground the spark plug to the cylinder as done in a spark test.



With the ignition coil primary wire connected, connect the peak voltage adapter or tester probes to the ignition coil.

TOOLS:
Imrie diagnostic tester (model 625) or
Peak voltage adaptor 07HGJ-0020100
with commercially available digital multimeter
(impedance 10 MΩ/DCV minimum)

CONNECTION:
Yellow/Blue (–) – Body ground (+)



Turn the ignition switch to "ON" and measure the initial voltage at this time.
The battery voltage should be measured.
If the initial voltage cannot be measured, check the power supply circuit (page 17-4).

Avoid touching the spark plug and tester probes to prevent electric shock.

Hold the throttle grip fully opened position and crank the engine with the starter motor and measure the ignition coil primary peak voltage.

PEAK VOLTAGE: 100 V minimum

If the peak voltage is lower than specified value, follow the checks described in the troubleshooting chart (page 17-4).

Install the removed parts in the reverse order of removal.

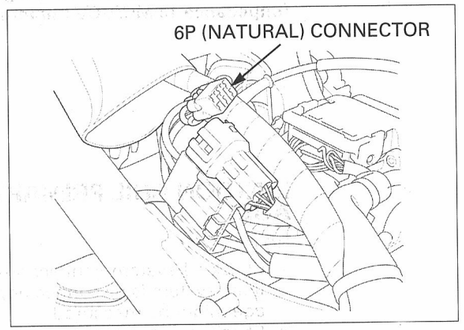
CKP SENSOR CIRCUIT INSPECTION

- Before this inspection, check the ECM power/ground line inspection (page 6-67).

1. CKP Sensor Ground Line Inspection

Remove the floor step (page 3-7).

Turn the ignition switch "OFF".
Disconnect the alternator/starter 6P (Natural) connector.



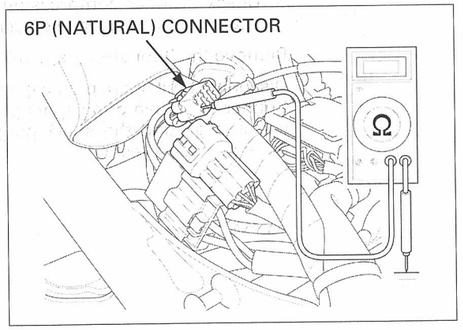
Check for continuity between the alternator/starter 6P (Natural) connector of the wire harness side and ground.

CONNECTION: Blue/Green (+) – Ground (–)

Is there continuity?

YES – GO TO STEP 2.

NO – Open circuit in Blue/Green wire between the ECM and alternator/stator 6P (Black) connector.



2. CKP Sensor Power Line Inspection

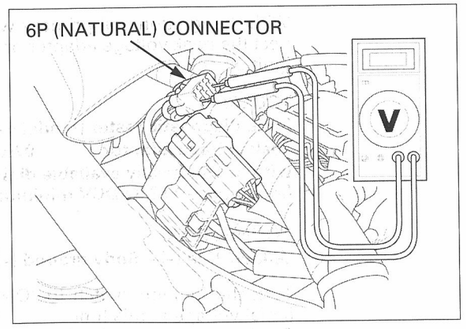
Turn the ignition switch "ON".
Measure the voltage at the alternator/starter 6P (Natural) connector terminals of the wire harness side.

CONNECTION: Brown/Yellow (+) – Blue/Green (–)
STANDARD: Battery voltage

Is there battery voltage?

YES – GO TO STEP 3.

NO – • Open circuit in Brown/Yellow wire between the ECM and alternator/starter 6P (Black) connector
• Replace the ECM with a new one, then recheck.



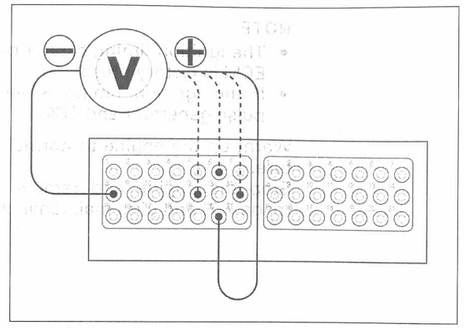
3. CKP Sensor Output Voltage Inspection

Remove the belt case cover (page 10-6).
Connect the test harness to ECM 21P (Black) and 21P (Gray) connectors (page 6-10).

TOOL:
ECM test harness 070MZ-GEV0100

Connect the alternator/starter 6P (Natural) connector.
Turn the ignition switch "ON".
Measure the voltage at the test harness terminals with turning the crankshaft.

CONNECTION: B20 (+) – B8 (–)
B14 (+) – B8 (–)
B12 (+) – B8 (–)
B6 (+) – B8 (–)
STANDARD: Repeat no voltage (below 0.5 V) to exist voltage (5 – 10 V)



Are the voltages at the standard value?

YES – Faulty alternator/stater.

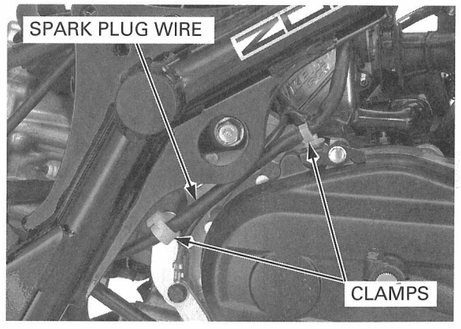
NO – • Open or short circuit in Blue/Yellow and White/Black wires.
• Open or short circuit in White/Red and White/Green wires.
• Faulty stator (CKP sensor).

IGNITION COIL

REMOVAL/INSTALLATION

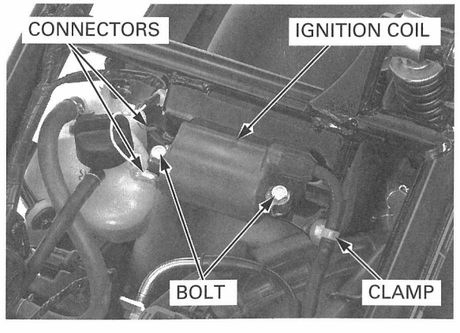
Remove the floor step (page 3-7).

Disconnect the spark plug cap from the plug.
Remove the spark plug wire from the clamps.



Disconnect the ignition coil wire connectors.
Remove the clamp.
Remove the bolt and ignition coil.

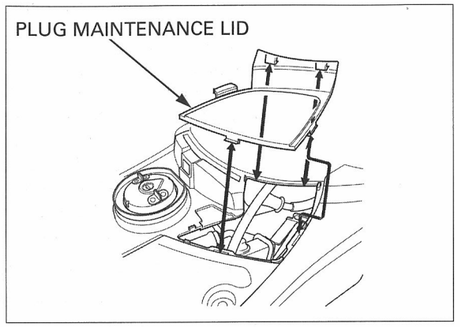
Installation is in the reverse order of removal.



IGNITION TIMING

NOTE:
- The ignition timing cannot be adjusted since the ECM is factory preset.
- If the ignition timing is incorrect, inspect the pulse generator and ECM.

Warm up the engine to normal operating temperature.
Stop the engine and remove the radiator cover (page 7-7) and plug maintenance lid (page 4-6).



Read the instructions for timing light operation.

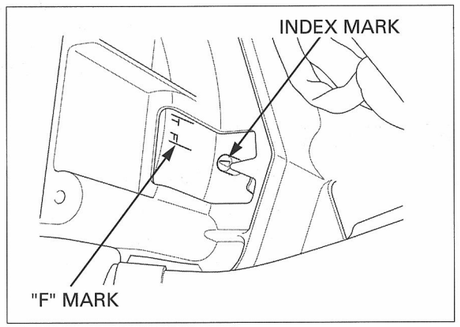
Connect the timing light to the spark plug wire.

Start the engine, let it idle and check the ignition timing.

IDLE SPEED: 2,000 ± 100 min^{-1} (rpm)

The ignition timing is correct if the "F" mark on the flywheel aligns with the index mark at idle.

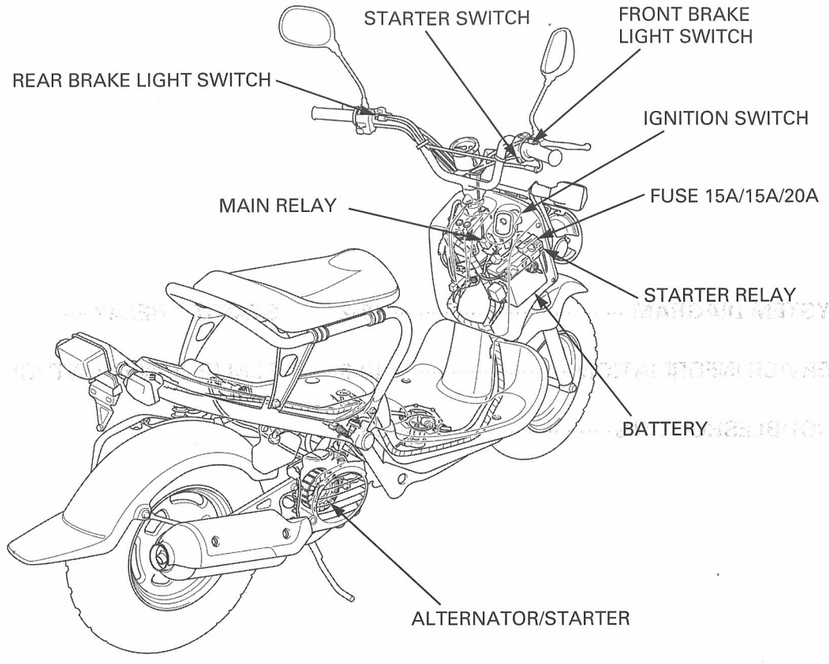
Install the removed parts in the reverse order of removal.

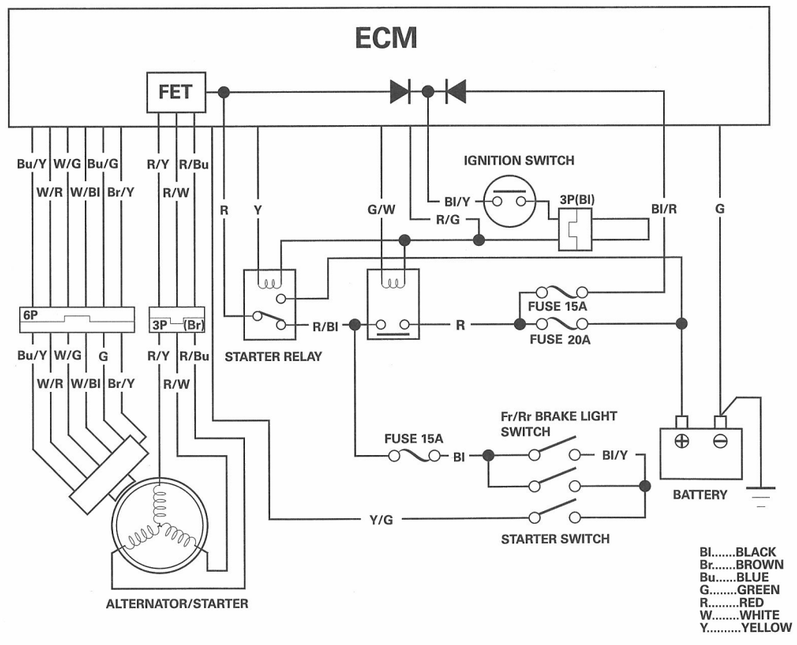


18. ELECTRIC STARTER

SYSTEM DIAGRAM 18-2
SERVICE INFORMATION 18-3
TROUBLESHOOTING 18-4
STARTER RELAY 18-6
ECM (ENGINE CONTROL MODULE) 18-8

SYSTEM DIAGRAM





SERVICE INFORMATION

GENERAL

- Some electrical components may be damaged if terminals or connectors are connected or disconnected while the ignition switch is turned to "ON" and current is present.
- When servicing the electric starter, always follow the steps in the troubleshooting sequence on (page 18-4).
- This scooter has adopted an alternator/starter that functions like both an alternator and starter motor.
- A weak battery may be unable to turn the starter quickly enough, or supply adequate ignition current.
- For the alternator/starter removal/installation, See page 12-4.
- Refer to page 18-6 to check the stator and main relay.
- Refer to page 19-16, page 19-18 and page 19-18 to check the ignition switch, starter switch and brake light switch.

TOOLS

ECM test harness 070MZ-GEV0100	Test probe 07ZAJ-RDJA110
	

TROUBLESHOOTING

Alternator/Starter does not turn (Flywheel does not turn)

1. **Fuse Inspection**

   Check for a blown main fuse (20A) and sub fuses (15A).

   Is either fuse blown?

   YES – Replace the fuse.

   NO – GO TO STEP 2.

2. **Battery Inspection**

   Check if the battery is fully charged and is in good condition. Also check that there is no loose terminals or connections.

   Is the battery in good condition?

   YES – GO TO STEP 3.

   NO – Fully charge or replace the battery.

3. **Starter Relay Operation Check**

   With the ignition switch turned to "ON", squeeze the brake lever, push the starter switch and check for a "Click" sound from the starter relay.

   Is a "Click" heard?

   YES – GO TO STEP 4.

   NO – GO TO STEP 9.

4. **Battery Ground Circuit Inspection**

   Check the battery ground circuit at the ECM (page 16-8).
   Check for continuity between the Green wire terminals of the wire harness and body ground.

   Does continuity exist?

   YES – GO TO STEP 5.

   NO – Open circuit in the Green wire between the ECM 5P (Black) and 21P (Black) connectors and battery.

5. **Stator Coil Inspection**

   Check the stator coil resistance at the ECM side (page 16-9).

   Is the resistance held within the standard?

   YES – GO TO STEP 6.

   NO –
   - Open circuit in the Red/Yellow, Red/Blue and Red/White wires between the ECM 5P (Black) connector and alternator 3P (Brown) connector.
   - Faulty stator coil.
   - Loose or poorly connected stator related connector.

6. **Starter Relay Circuit Inspection**

   Inspect the starter relay circuit at the ECM (page 18-6).

   Is the starter relay circuit in good condition?

   YES – GO TO STEP 7.

   NO – • Open circuit in the Red wire between the ECM 5P (Black) connector and starter relay.

7. **Starter Relay Inspection**

   Check the operation of the starter relay (page 18-6).

   Is the starter relay in good condition?

   YES –
   - GO TO STEP 8. (if from step 6)
   - GO TO STEP 10. (if from step 9)

   NO – Faulty starter relay.

8. **CKP Sensor Circuit Inspection**

   Inspect the CKP sensor circuit at the alternator/starter 6P (Natural) connector side (page 18-8).

   Does continuity exist?; Is the voltage normal?

   NO –
   - Open circuit in the Green wire between the alternator/starter 6P (Natural) connector and ground.
   - Open circuit in the Brown/Yellow, White/Red, White/Green and White/Black wires between the alternator/starter 6P (Natural) connector and ECM 21P (Gray) connector.
   - Faulty ECM.

   YES – Faulty angle sensor (replacement of stator assembly required).

9. **Starter Switch Circuit Inspection**

   Inspect the starter switch circuit at the ECM side (page 18-8).

   Is the starter switch circuit normal?

   YES – GO TO STEP 7.

   NO –
   - Open circuit in the Green/Yellow wire between the brake light switch and starter switch.
   - Faulty starter switch.
   - Open circuit in Yellow/Green wire between the starter switch and ECM.
   - Loose or poorly connected connector of starter switch circuit.

10. **Starter Relay Battery Voltage Line Inspection**

    Inspect the starter relay battery voltage line (page 18-7).

    Is the battery voltage line normal?

    YES – GO TO STEP 11.

    NO –
    - Open circuit in the Red/Green wire between the starter relay and ignition switch.
    - Loose or poorly connected connector.

11. **Starter Relay Ground Line**

    Inspect the starter relay coil ground line (page 18-7).

    Is the starter relay ground circuit in good condition?

    YES – Replace the ECM and inspect again.

    NO – Open circuit in the Yellow wire between the starter relay and ECM.

STARTER RELAY

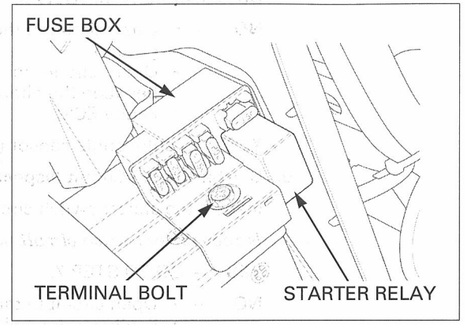
REMOVAL/INSTALLATION

Remove the inner cover (page 3-5).

Disconnect the battery negative (–) cable and remove the fuse box cover (page 16-6).

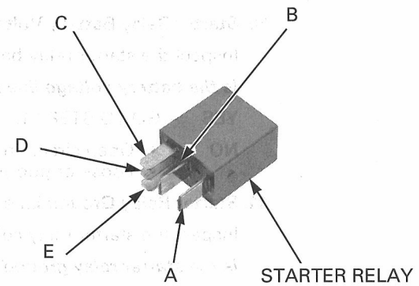
Remove the terminal bolt and disconnect the fuse box/battery positive (+) cable.
Remove the starter relay from the fuse box.

Install the removed parts in the reverse order of removal.

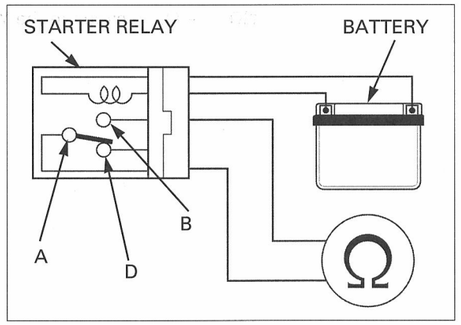


OPERATION INSPECTION

Remove the starter relay.
Check for continuity between the A and D terminals. There should be continuity at the terminals. There should be no continuity when the battery is connected to E (+) and C (–) terminals of the starter relay.



Check for continuity between the A and B terminals. There should be no continuity at the terminals. There should be continuity when the battery is connected to E (+) and C (–) terminals of the starter relay.



RELAY CIRCUIT INSPECTION

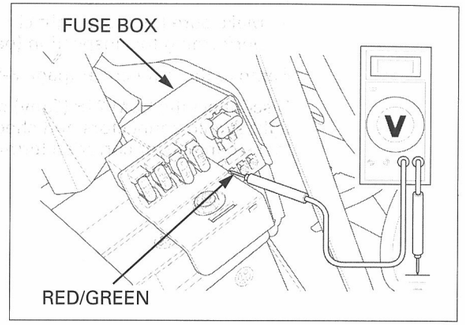
NOTE:
- Make sure the main relay and relative circuit is normal before performing this inspection.

Remove the starter relay.
Connect the fuse box/battery positive (+) cable and negative (–) cable.

BATTERY VOLTAGE LINE

Measure the voltage between the Red/Green wire terminal of the starter relay connector and ground.

If battery voltage is present only when the ignition switch is turned to "ON", the circuit is normal.



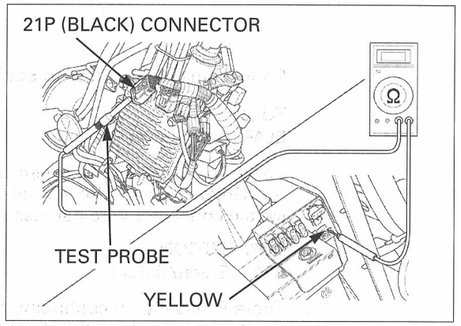
GROUND LINE

Turn the ignition switch to "OFF".
Disconnect the ECM 21P (Black) connector and check the connector for loose contacts or corroded terminals.

Check for continuity between the Yellow wire terminals of the ECM 21P (Black) connector and starter relay switch connector.

TOOL:
Test probe **07ZAJ-RDJA110**

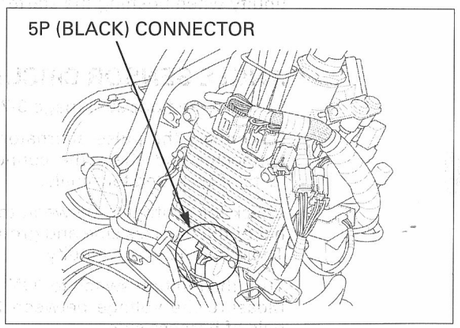
There should be continuity.



STARTER CIRCUIT INSPECTION

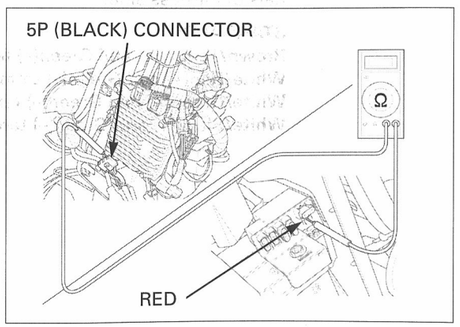
Turn the ignition switch to "OFF".

Disconnect the ECM 5P (Black) connector and check the connector for loose contacts or corroded terminals.



Check for continuity between the Red wire terminals of the starter relay connector and ECM 5P (Black) connector.

It is normal if there is continuity.



ECM (ENGINE CONTROL MODULE)

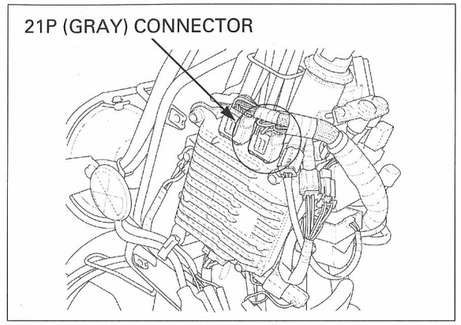
STARTER SWITCH CIRCUIT INSPECTION

NOTE:

- Make sure the brake light circuit is normal before performing this inspection (page 19-18).

Remove the front cover (page 3-6).

Disconnect the ECM 21P (Gray) connector and brake light switch connectors and check the connector for loose contacts or corroded terminals.



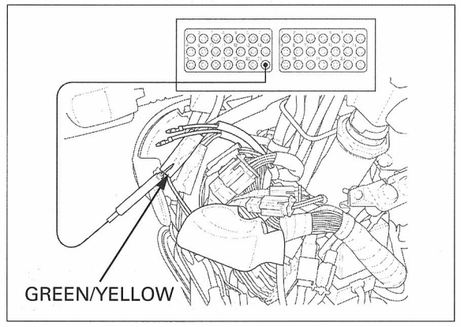
Connect the test harness to ECM connector.

TOOL:
ECM test harness 070MZ-GEV0100

Check for continuity between the test harness and the Green/Yellow wire terminal of the brake light switch connector wire harness side.

CONNECTION:
B21 – Green/Yellow

There is usually no continuity, there should be continuity when pushing the starter switch.



ANGLE SENSOR CIRCUIT INSPECTION

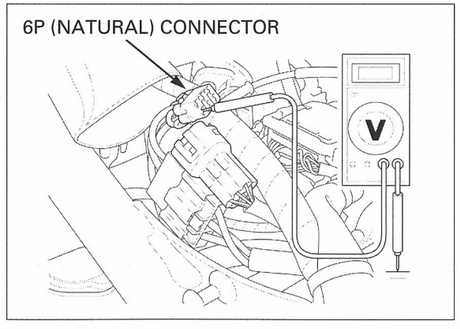
Remove the floor step (page 3-7).

Disconnect the pulse alternator/starter 6P (Natural) connector and check the connector for loose contacts of corroded terminals.

Check for continuity between the Green wire terminal of the harness side and ground.
There should be continuity.

Turn the ignition switch to "ON".
Measure the voltage between the following terminals of harness side:

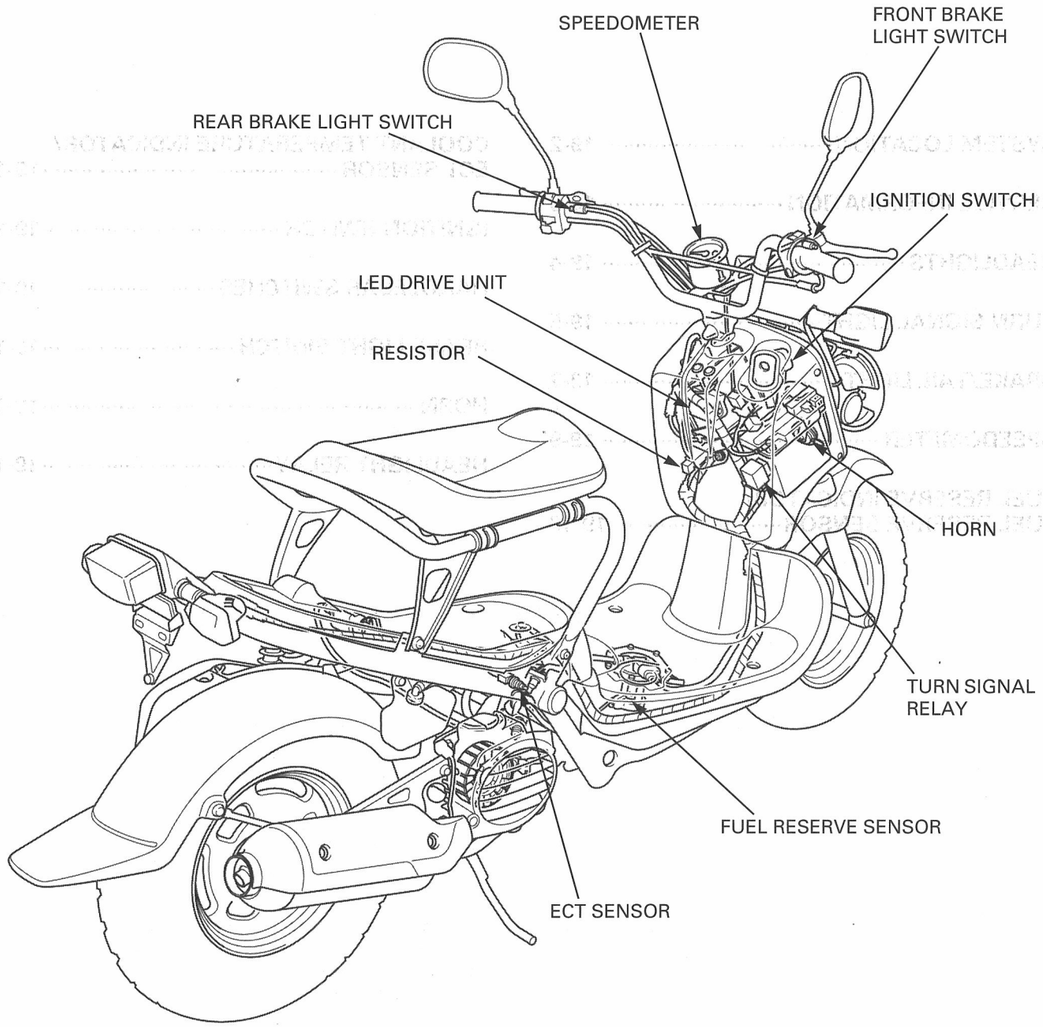
STANDARD:
Brown/Yellow(+) and Green(–) terminals: about 10 V
White/Red(+) and Green(–) terminals: about 8.5 V
White/Green(+) and Green(–) terminals: about 8.5 V
White/Black(+) and Green(–) terminals: about 8.5 V



19. LIGHTS/METERS/SWITCHES

SYSTEM LOCATION 19-2
SERVICE INFORMATION 19-3
HEADLIGHTS 19-4
TURN SIGNAL LIGHT 19-5
BRAKE/TAIL LIGHT 19-7
SPEEDOMETER 19-9
FUEL RESERVE INDICATOR/
FUEL RESERVE SENSOR 19-10
COOLANT TEMPERATURE INDICATOR/
ECT SENSOR 19-13
IGNITION SWITCH 19-16
HANDLEBAR SWITCHES 19-17
BRAKE LIGHT SWITCH 19-18
HORN 19-19
HEADLIGHT RELAY 19-19

SYSTEM LOCATION



SERVICE INFORMATION

GENERAL

- Check the battery condition before performing any inspection that requires proper battery voltage.
- A continuity test can be made with the switches installed on the scooter.
- Route the wires and cables properly after servicing each component (page 1-15).
- The following color codes are indicated through out this section.

Bu: Blue	G: Green	Lg: Light Green	W: White
Bl: Black	Gr: Gray	O: Orange	Y: Yellow
Br: Brown	Lb: Light Blue	R: Red	

SPECIFICATIONS

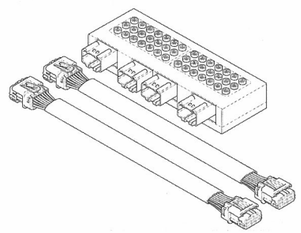
ITEM			SPECIFICATIONS
Bulbs	Headlight (high/low beam)		12V-35/35W X 2
	Brake/tail light		12V-21/5W
	Front turn signal light		12V-21W X 2
	Rear turn signal light		12V-21W X 2
	Speedometer light		12V-1.7W
	Malfunction indicator lamp (MIL)		LED
	Water temperature indicator		LED
	Fuel reserve indicator		LED
Fuse	Main fuse		20A
	Sub fuses		15A X 2
ECT (Engine Coolant Temperature) sensor resistance		At 50 °C/122 °F	690 – 860 Ω
		At 130 °C /266 °F	68 – 83 Ω

TORQUE VALUES

Turn signal light mounting nut	9.8 N·m (1.0 kgf·m, 7 lbf·ft)
ECT sensor	18 N·m (1.8 kgf·m, 13 lbf·ft)

TOOLS

ECM test harness
070MZ-GEV0100



HEADLIGHTS

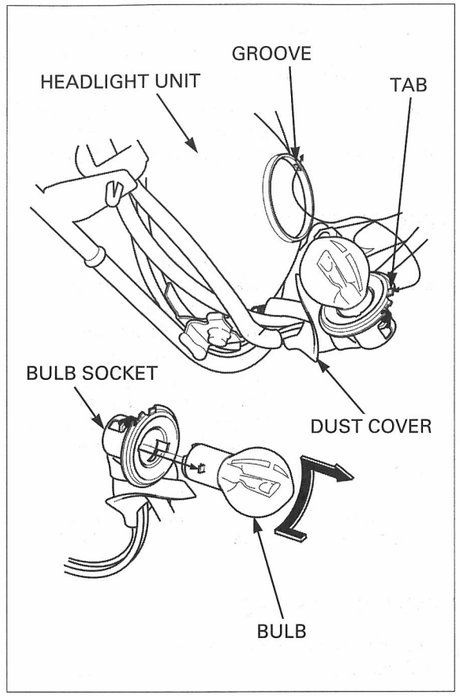
HEADLIGHT BULB REPLACEMENT

Remove the dust cover from the headlight unit.

Unhook the bulb socket tab from the groove on the headlight unit.

Push the headlight bulb in, turn it counterclockwise and remove it.

Install the headlight bulb in the reverse order of removal.



INSPECTION

NOTE:

- The headlights can turn on after starting the engine.
- Make sure that the following items are normal before this inspection.
  - Sub fuse (15A)
  - Starter relay operation (page 18-6)
  - Headlight relay
  - Dimmer switch (page 19-18)

Headlight is not turned on

1. **Headlight Circuit Inspection 1**

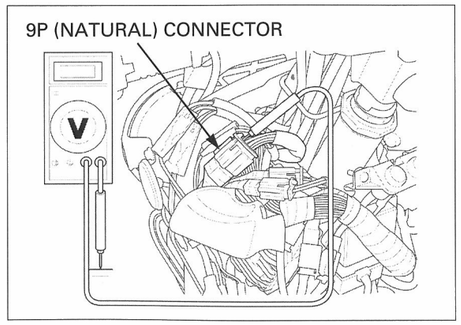
   Remove the front cover (page 3-6).

   Turn the ignition switch to "ON".
   Measure the voltage between the Black/Yellow wire terminal (+) of the left handlebar switch 9P (Natural) connector at the harness side and body ground (–).
   The battery voltage should come on.

   Does the battery voltage come on?

   YES – GO TO STEP 2.

   NO – • Open or short circuit in the wire harness.
   • Poorly connected terminal.



2. **Headlight Circuit Inspection 2**

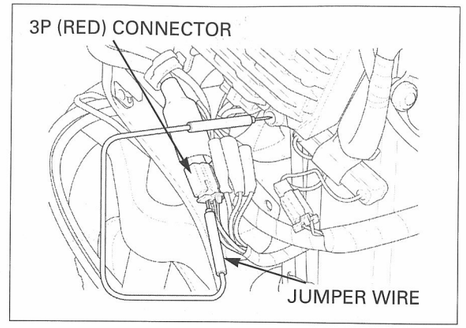
   Install the front cover (page 3-6).

   With the headlight 3P (Red) connector plugged in, ground the Green wire terminal with a jumper wire.
   The headlight circuit is normal if the headlight is turned on when the ignition switch is turned to "ON".

   Are the headlights turned on?

   YES – • Open circuit in Green wire between the headlight and ECM.
   • Faulty ECM

   NO – • Open circuit in the Blue and/or White wire between the left handlebar switch 9P (Natural) connector and headlight 3P (Red) connector.
   • Check the dimmer switch (page 19-18).



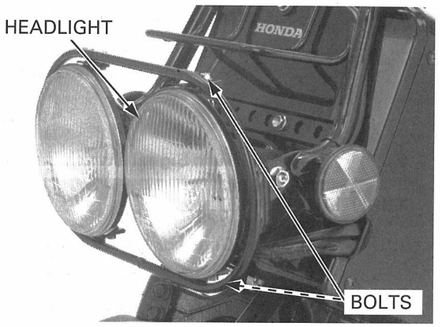
REMOVAL/INSTALLATION

Remove the headlight bulb (page 19-4).

Remove the bolts and headlight.

Install the removed parts in the reverse order of removal.

Adjust the headlight aim (page 4-14).

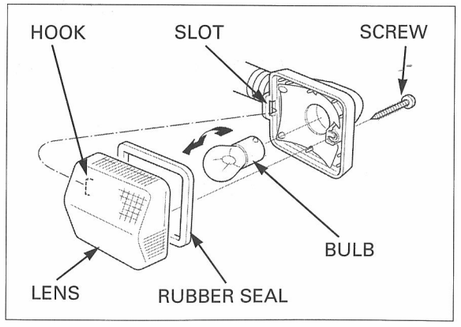


TURN SIGNAL LIGHT

BULB REPLACEMENT

Remove the screw and turn signal light lens.
While pushing the bulb in, turn it counterclockwise to remove it, and replace it with a new one.

Make sure the rubber seal is installed in position and is in good condition, and replace it with a new one if necessary.
Install the lens by aligning its hook with the slot of the turn signal light, and tighten the screw.



INSPECTION

NOTE:

- The turn signal lights can be operated with the ignition switch turned to "ON" even though the engine is not started. The lights will not work if the battery voltage falls below the prescribed limit. However, they will be ready for operation after starting the engine.
- Check the sub fuse (15A) before performing this inspection.

All the turn signal lights do not operate.

1. **Turn Signal Relay Inspection**

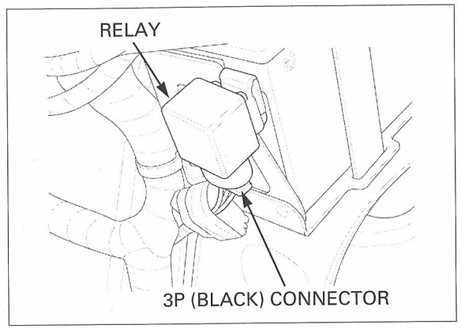
   Remove the inner cover (page 3-5).

   Disconnect the turn signal relay 3P (Black) connector.
   Using the jumper wire, short the Black and Gray wire terminals.
   Turn the ignition switch to "ON", and operate the turn signal switch.

   Do turn signals light up?

   NO – GO TO STEP 2.

   YES – • Faulty turn signal relay.
   • Poorly connected terminal.



2. **Turn Signal Switch Inspection**

   Inspect the turn signal switch for continuity (page 19-18).

   Does continuity exist?

   NO – Faulty turn signal switch.

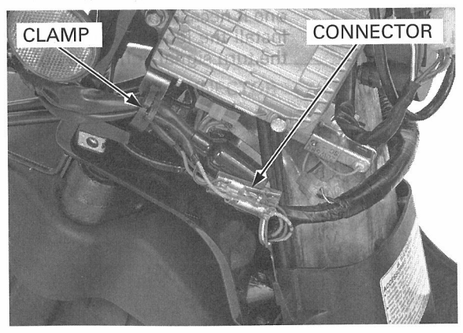
   YES – • An open circuit in the Black and/or Gray wire of the turn signal relay.
   • An open circuit in the Green/Black wire between the turn signal light and ECM.
   • Faulty ECM.

REMOVAL/INSTALLATION

FRONT

Remove the inner cover (page 3-5).

Disconnect the turn signal light connectors.
Remove the clamp.



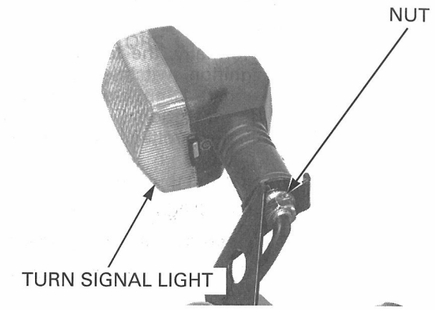
Remove the nut and turn signal light.

Route the wires properly.

Install the turn signal light to the headlight bracket and tighten the nut to the specified torque.

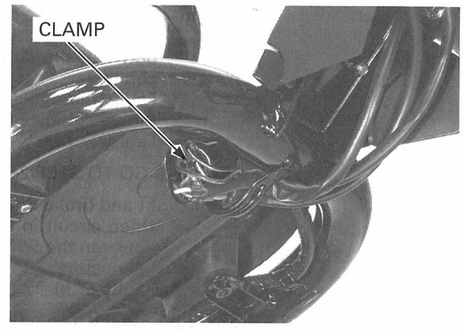
TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Installation is in the reverse order of removal.



REAR

Release the wires from the clamp.
Disconnect the turn signal light connectors.



Remove the nut and turn signal light.

Install the turn signal light to the tail light bracket and tighten the nut to the specified torque.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Route the wires properly.

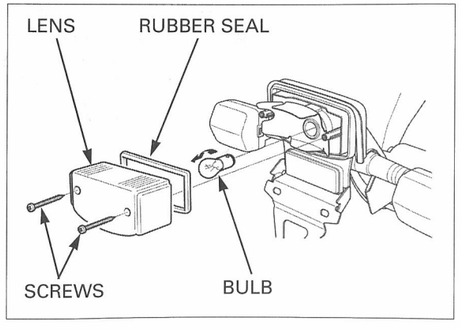
Installation is in the reverse order of removal.

BRAKE/TAIL LIGHT

BULB REPLACEMENT

Remove the screws and brake/tail light lens.
While pushing the bulb in, turn it counterclockwise to remove it, and replace it with a new one.

Make sure that the rubber seal is installed in position and is in good condition. Replace it with a new one if necessary.
Install the brake/tail light lens and tighten the screws.



INSPECTION

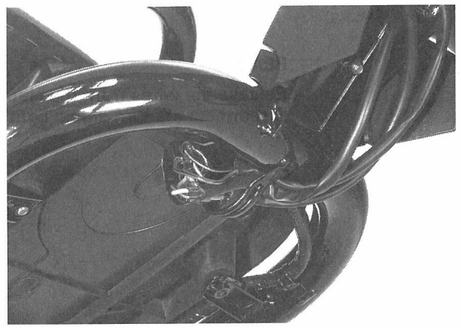
NOTE:

- Normally, the tail light will come on when the ignition switch is turned to "ON" even when the engine is not started, with the brake light ready for operation. The lights will not work when the battery voltage falls below the prescribed limit, but will go on or be ready for operation after starting the engine.

Brake/tail light does not operate

1. Operation of The Lights Inspection

Check if the tail light and brake light do not operate.



Which light does not operate?

Tail Light–

- Open circuit in the Black wire between the sub fuse and tail light connectors.
- Faulty main relay.
- Blown sub fuse (15A).
- Faulty ECM.

Brake light– GO TO STEP 2.

Both tail light and brake light–

- Open circuit in the Green/Black wire between the ECM and brake/tail light connectors.
- Faulty ECM.

2. Brake Light Switch Inspection

Turn the ignition switch to "ON".
Squeeze the front or rear brake lever and check the operation of the brake light.

Do either brake light not operate even if its brake lever is squeezed?

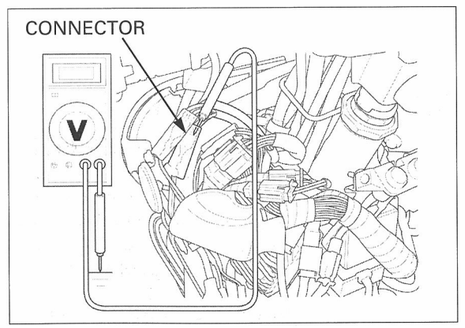
NO – Inspect the brake light switch (page 19-18).

YES – GO TO STEP 3.

3. Brake Light Circuit Inspection

Remove the front cover (page 3-6).

With the ignition switch turned to "ON", check that the battery voltage is present between the Black wire connector of the brake light switch and body ground.
The brake light switch circuit is normal if battery voltage is present.



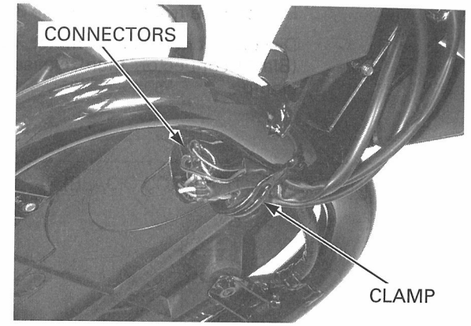
Is battery voltage present?

NO – • Open circuit in the Black wire.
- Faulty main relay
- Blown sub fuse (15A).
- Faulty ignition switch (page 19-16).
- Faulty ECM.

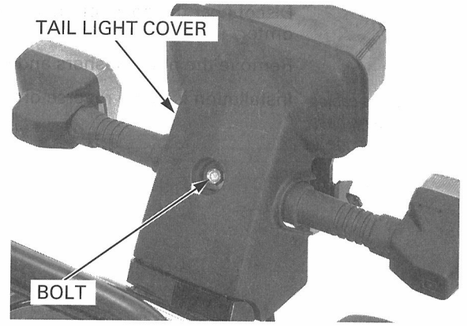
YES – • Open circuit in the Green/Yellow wire between the brake light switch and brake light.

REMOVAL/INSTALLATION

Release the wires from the clamp.
Disconnect the brake/tail light connectors.



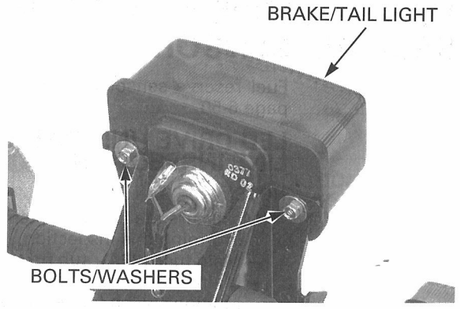
Remove the bolt and tail light cover.



Route the wire harness correctly (page 1-15).

Remove the bolts/washers and brake/tail light.

Installation is in the reverse order of removal.



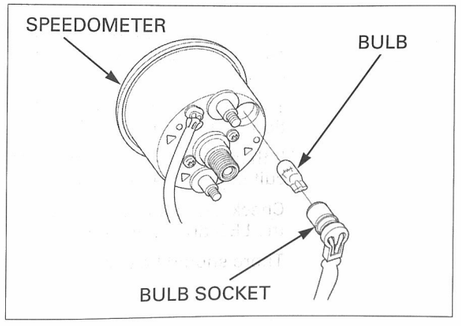
SPEEDOMETER

BULB REPLACEMENT

Remove the speedometer (page 19-10).

Remove the bulb socket from the speedometer and replace the bulb with a new one.

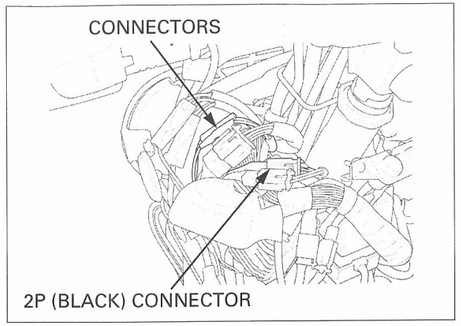
Installation is in the reverse order of removal.



REMOVAL/INSTALLATION

Remove the front cover (page 3-6)

Disconnect the speedometer light connectors, 3P (Black) connector, then release the wires from the clamp.

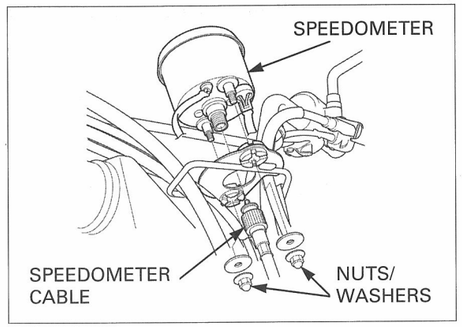


Disconnect the speedometer cable from the speedomter.

Remove the nuts, washers and speedometer.

Route the cables and wire harness properly (page 1-15).

Installation is in the reverse order of removal.



FUEL RESERVE INDICATOR/FUEL RESERVE SENSOR

Fuel reserve sensor removal/installation is refer to page 6-50.

LED DRIVE UNIT BATTERY/GROUND LINE INSPECTION

NOTE:

- Make sure the following items are normal, before performing this inspection
  - Main fuse (20A), sub fuse (15A)
  - Main relay
  - Ignition switch (page 19-16)
  - ECM (page 16-8)

Remove the inner cover (page 3-5).

Turn the ignition switch to "ON".

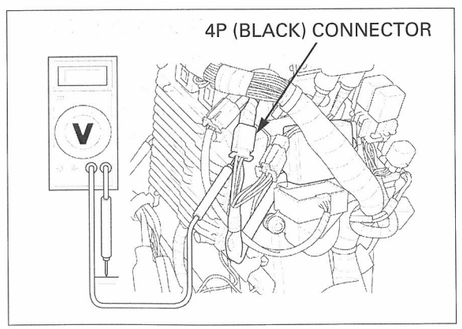
Measure the voltage between the Black wire terminal of the LED drive unit 4P (Black) connector and Ground.

There should be battery voltage only when the ignition switch turns to "ON".

If there is no voltage, check for an open or short circuit in the wire harness.

Check the continuity of Green/Black wire between the LED drive unit and ECM.

There should be continuity.



SYSTEM INSPECTION

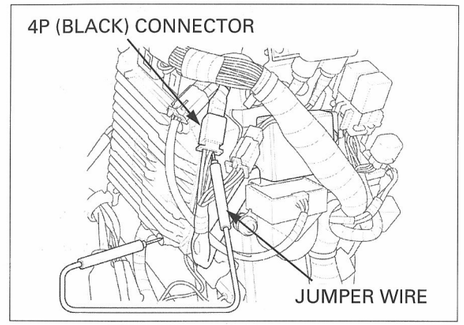
NOTE:

- Make sure the battery and ground line of the LED drive unit is normal, before performing this inspection.

When the fuel reserve indicator does not light.

1. Fuel Reserve Sensor Line Inspection

Ground the Blue/White wire terminal of the LED drive unit 4P (Black) connector with a jumper wire.

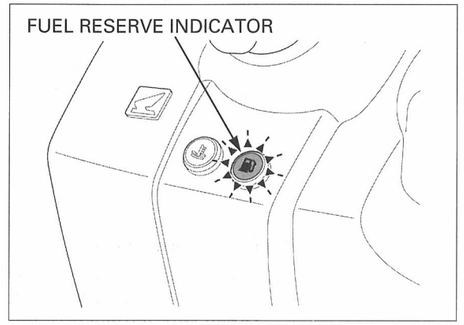


Turn the ignition switch to "ON", check that the fuel reserve indicator lights.

Does the indicator light?

NO – GO TO STEP 2.

YES –
- An open circuit in the Blue/White wire between the LED drive unit 4P (Black) and fuel reserve sensor.
- Open circuit in the Green/Black wire between the fuel reserve sensor and ECM.
- Faulty fuel reserve sensor.



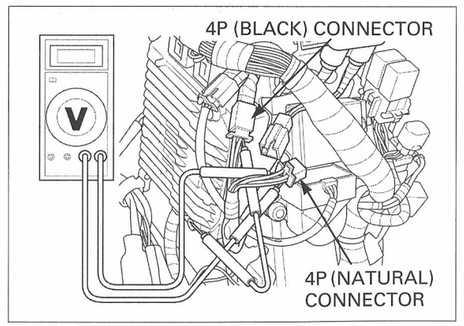
2. Fuel Indicator Line Inspection

Ground the Blue/White wire terminal of the LED drive unit 4P (Black) connector with a jumper wire.
Measure the voltage between the Gray/Red (+) and Green/Blue (–) wire terminals of the fuel reserve indicator 4P (Natural) connector.

Is there approx. 3V?

NO – Faulty LED drive unit.

YES – Faulty LED.



When the indicator always lights during a operation

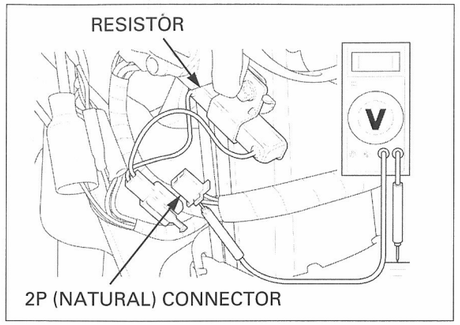
1. **Resistor Line Inspection 1**

   Turn the ignition switch to "ON".
   Measure the voltage between the Black wire terminal of the resistor 2P (Natural) connector and Ground.

   Does the voltage exist?

   NO – Open circuit in the Black wire between the resistor 2P (Natural) connector and main wire harness.

   YES – GO TO STEP 2.



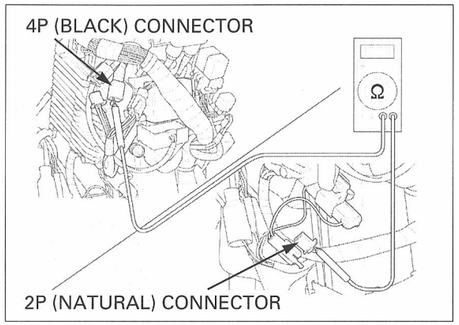
2. **Resistor Line Inspection 2**

   Check the continuity of Blue/White wire between the resistor and LED drive unit.

   Is there continuity?

   NO – Open circuit in wire harness

   YES – GO TO STEP 3.



3. **Resistor Inspection**

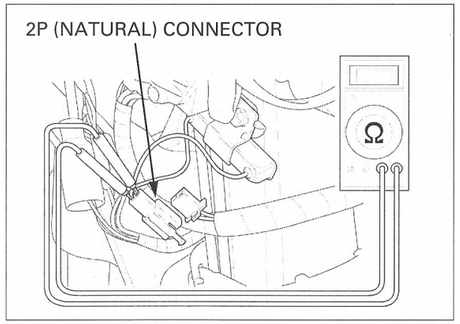
   Disconnect the resistor 2P (Natural) connector. Measure the resistance between the Black and Green wire terminals of the resistor 2P (Natural) connector.

   STANDARD: 64 – 72 kΩ (20° C/68° F)

   Is the resistance within the standard?

   NO – Faulty resistor

   YES – • Short circuit in the Blue/White wire.
   • Faulty fuel reserve sensor.



INDICATOR UNIT REMOVAL/INSTALLATION

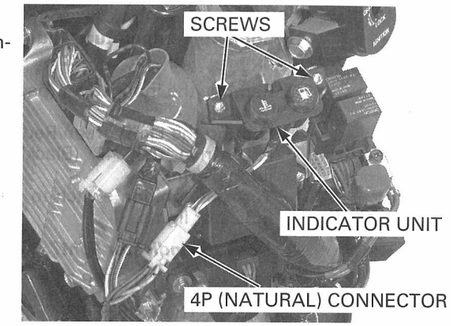
Remove the inner cover (page 3-5).

Disconnect the LED indicator unit 4P (Natural) connector.

Remove the screws and the indicator unit.

Installation is in the reverse order of removal.

Install the inner cover (page 3-5).



LED INDICATOR UNIT REMOVAL/INSTALLATION

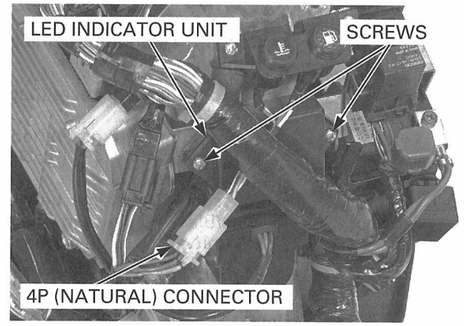
Remove the inner cover (page 3-5).

Disconnect the LED indicator unit 4P (Natural) connector.

Remove the screws and the LED indicator unit.

Installation is in the reverse order of removal.

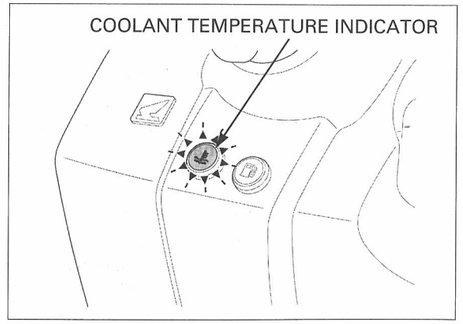
Install the inner cover (page 3-5).



COOLANT TEMPERATURE INDICATOR/ECT SENSOR

NOTE:

- When the coolant temperature exceeds 120 °C (248 °F), the coolant temperature indicator will turn on. The ECM will then control the ignition and reduce engine speed below 5,000 min^{-1} (rpm). At this time, check the cooling system and engine for leaks or damage. If everything is OK, check the following.
- Make sure the battery and ground line of the LED drive unit is normal (page 19-13), before performing this inspection.



SYSTEM INSPECTION

When the coolant temperature indicator does not light.

1. **Coolant Temperature Indicator Circuit Inspection 1**

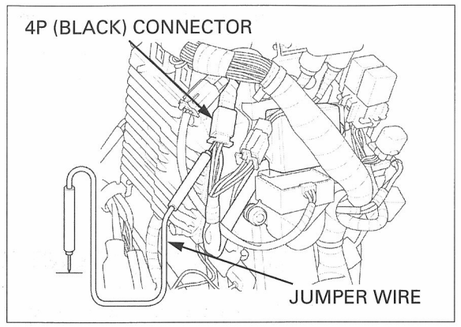
   Remove the inner cover (page 3-5).

   Ground the Light green/Red wire terminal of the LED drive unit 4P (Black) connector with a jumper wire.
   Turn the ignition switch to "ON", check that the indicator lights.

   Does the indicator light?

   NO – GO TO STEP 2.

   YES – GO TO STEP 3.



2. **Coolant Temperature Indicator Circuit Inspection 2**

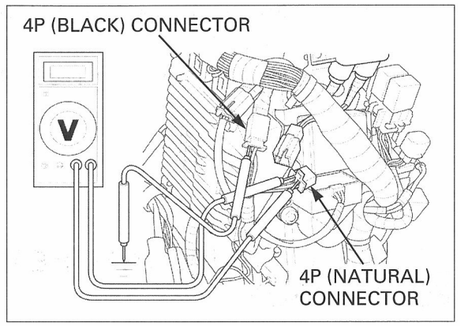
   Remove the front cover (page 3-6).

   Ground the Light green/Red wire terminal of the LED drive unit 4P (Black) connector with a jumper wire.
   Measure the voltage between the Pink (+) and Blue/Black (–) wire terminals of the water indicator unit 4P (Natural) connector.

   Is there approx. 3 V?

   NO – GO TO STEP 3.

   YES – Faulty LED



3. **ECT Sensor Circuit Inspection**

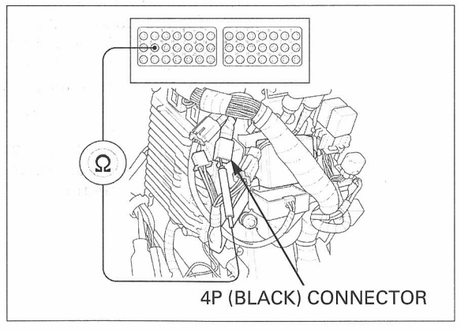
   Connect the test harness to ECM (page 6-10).
   TOOL:
   ECM test harness 070MZ-GEV0100

   Check for continuity between the test harness and LED drive unit 4P (Black) connector of the wire harness side.
   CONNECTION: A9 – Light green/Red

   Is there continuity?

   NO – • Open circuit in the Light green/Red wire between the ECM and LED drive unit.

   YES – • Inspect the ECT sensor (page 19-15).
   • Faulty ECM.



When the indicator always lights during a operation

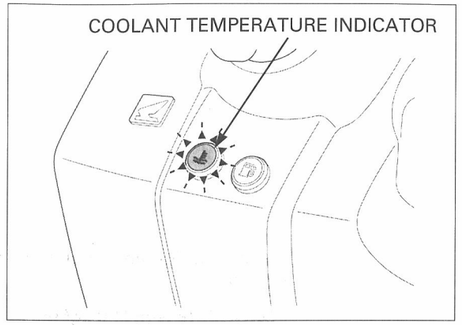
1. **Coolant Temperature Indicator Circuit Inspection (short circuit)**

   Remove the inner cover (page 3-5).
   Turn the ignition switch to "ON" (engine not started) and check that the indicator lights.

   Does the indicator lights?

   NO – GO TO STEP 2.

   YES – Short circuit of Light green/Red wire between the LED drive unit and ECM.



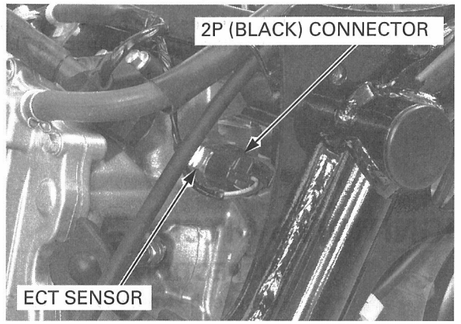
2. **ECT Sensor Circuit Inspection**

   Remove the floor step (page 3-7).
   Disconnect the ECT sensor 2P (Black) connector.
   Ground the Pink wire of the 2P (Black) connector wire harness side with a suitable jumper wire.
   Start the engine, check that the indicator lights.

   Does the indicator light?

   NO – • Open circuit of Pink wire between the ECM and ECT sensor.
   • Faulty ECM.

   YES – Inspect the ECT sensor (page 19-15).



ECT SENSOR INSPECTION

Remove the floor step (page 3-7).
Drain the coolant from the cooling system (page 7-6).

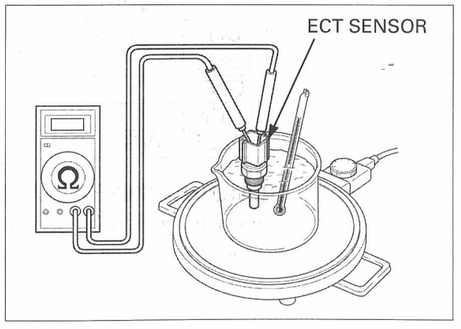
Disconnect the ECT sensor 2P (Black) connector and remove the ECT sensor (page 6-63).

Keep all flammable materials away from the electric heating element.Wear protective clothing, insulated gloves and eye protection.

Suspend the ECT sensor in a pan of coolant (1:1 mixture) on an electric heating element and measure the resistance between the ECT sensor terminal and body as the coolant heats up.

NOTE:

- Soak the ECT sensor in coolant up to its threads with at least 40 mm (1.57 in) from the bottom of the pan to the bottom of the sensor.
- Keep the temperature constant for 3 minutes before testing. A sudden change of temperature will result in incorrect reading. Do not let the thermometer or ECT sensor touch the pan.

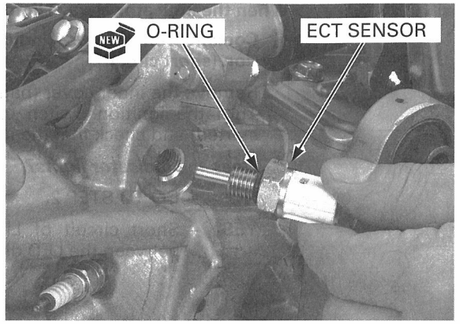


Measure the resistance between the ECT sensor terminal and its threads.

Temperature	50° C (122° F)	130° C (266° F)
Resistance	690 – 860 Ω	68 – 83 Ω

If the resistance is out of above range, replace the ECT sensor.

Install the new O-ring to the ECT sensor.

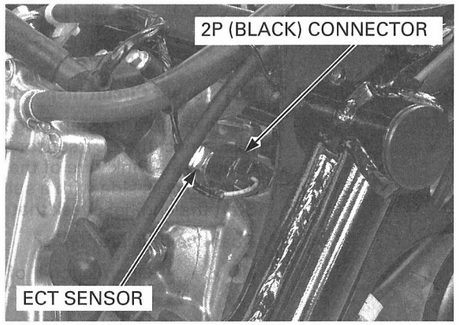


Install and tighten the ECT sensor with a new sealing washer.

TORQUE: 18 N·m (1.8 kgf·m, 13 lbf·ft)

Connect the ECT sensor 2P (Black) connector.

Fill and bleed the cooling system (page 7-7).
Install the floor step (page 3-7).



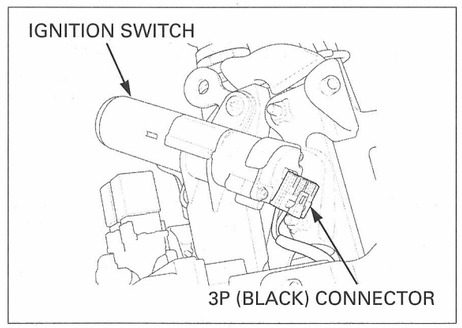
IGNITION SWITCH

INSPECTION

Remove the front cover (page 3-6).

Disconnect the ignition switch 3P (Black) connector.
Check for continuity between the connector terminals in each switch position.
Continuity should exist between the color code wires as follows:

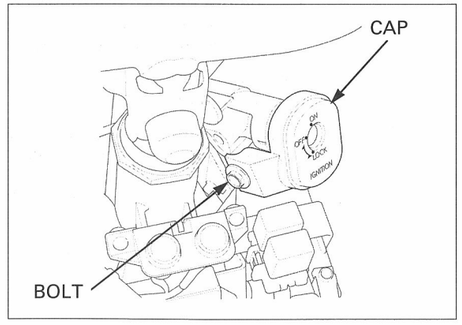
	BAT2	BAT1
ON	○	○
(OFF)		
OFF		
LOCK		
COLOR	R/G	R/Bu



REMOVAL/INSTALLATION

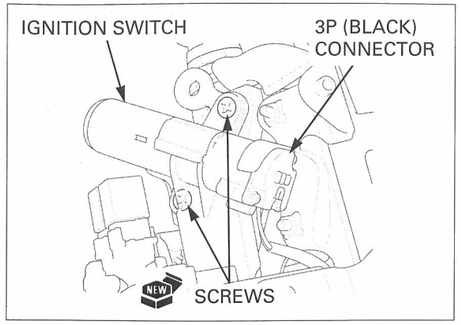
Remove the front cover (page 3-6).

Remove the bolt and ignition switch cap.



Disconnect the ignition switch 3P (Black) connector.
Remove the two screws and ignition switch.

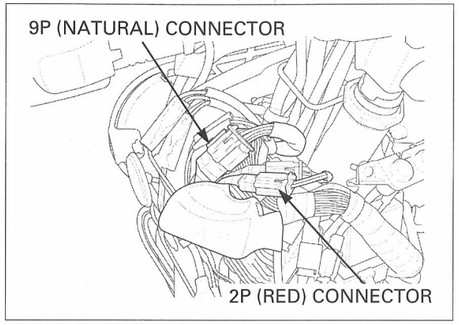
Use the new screws and install the removed parts in the reverse order of removal.



HANDLEBAR SWITCHES

Remove the front cover (page 3-6).

Disconnect the right handlebar switch 2P (Red) connector and left handlebar switch 9P (Natural) connector.
Check for continuity between the connector terminals in each switch position.
Continuity should exist between the color code wires as shown in the charts below.



LEFT HANDLEBAR SWITCH

TURN SIGNAL SWITCH

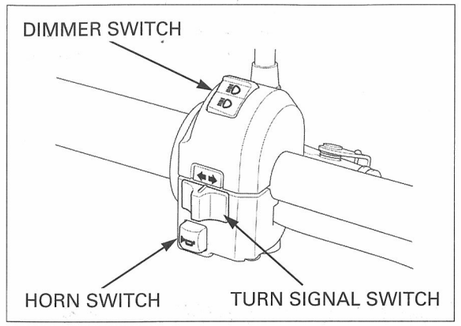
	W	R	L
⇦	○		○
N			
⇨	○	○	
COLOR	Gr	Lb	O

DIMMER SWITCH

	HL	Lo	Hi
≡D	○	○	
(N)	○	○	○
≡D	○		○
COLOR	Bl	W	Bu

HORN SWITCH

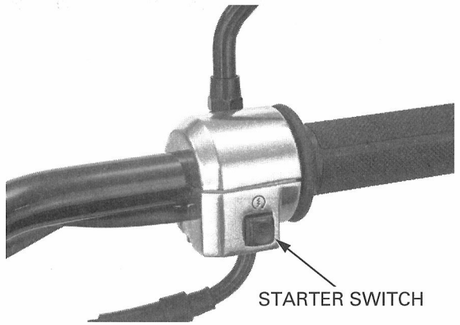
	HO	BAT2
FREE		
PUSH	○	○
COLOR	Lg	Bl



RIGHT HANDLEBAR SWITCH

STARTER SWITCH

	CDI	ST
FREE		
START	○	○
COLOR	Y/G	G/Y

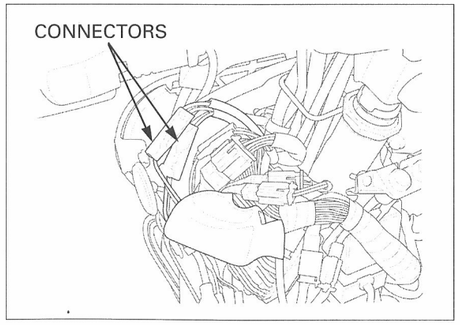


BRAKE LIGHT SWITCH

Remove the front cover (page 3-6).

Disconnect the brake light switch wire connectors and check for continuity between the switch side terminals.

There should be continuity with the brake lever squeezed, and there should be no continuity when the brake lever is released.

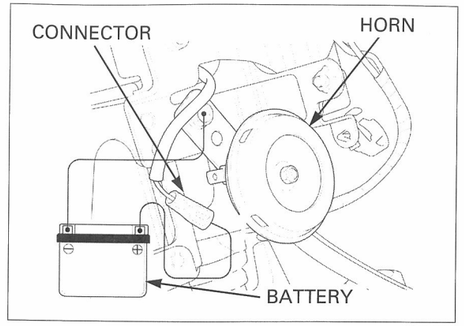


HORN

INSPECTION

Disconnect the horn connector from the horn.

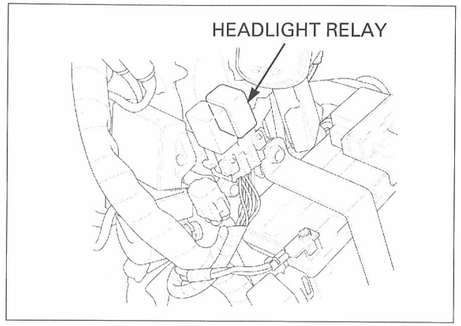
Connect a 12V battery to the horn terminals.
The horn is normal if it sounds when the 12V battery is connected across the horn terminals.



HEADLIGHT RELAY

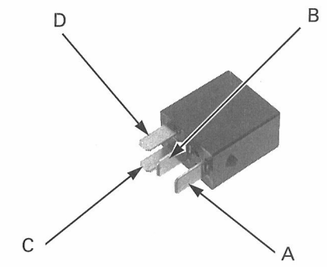
Remove the inner cover (page 3-5).

Remove the headlight relay.



Check for continuity between the A and B terminals.

There is usually no continuity, there should be continuity when the battery is connected to C (+) and D (–) terminals.



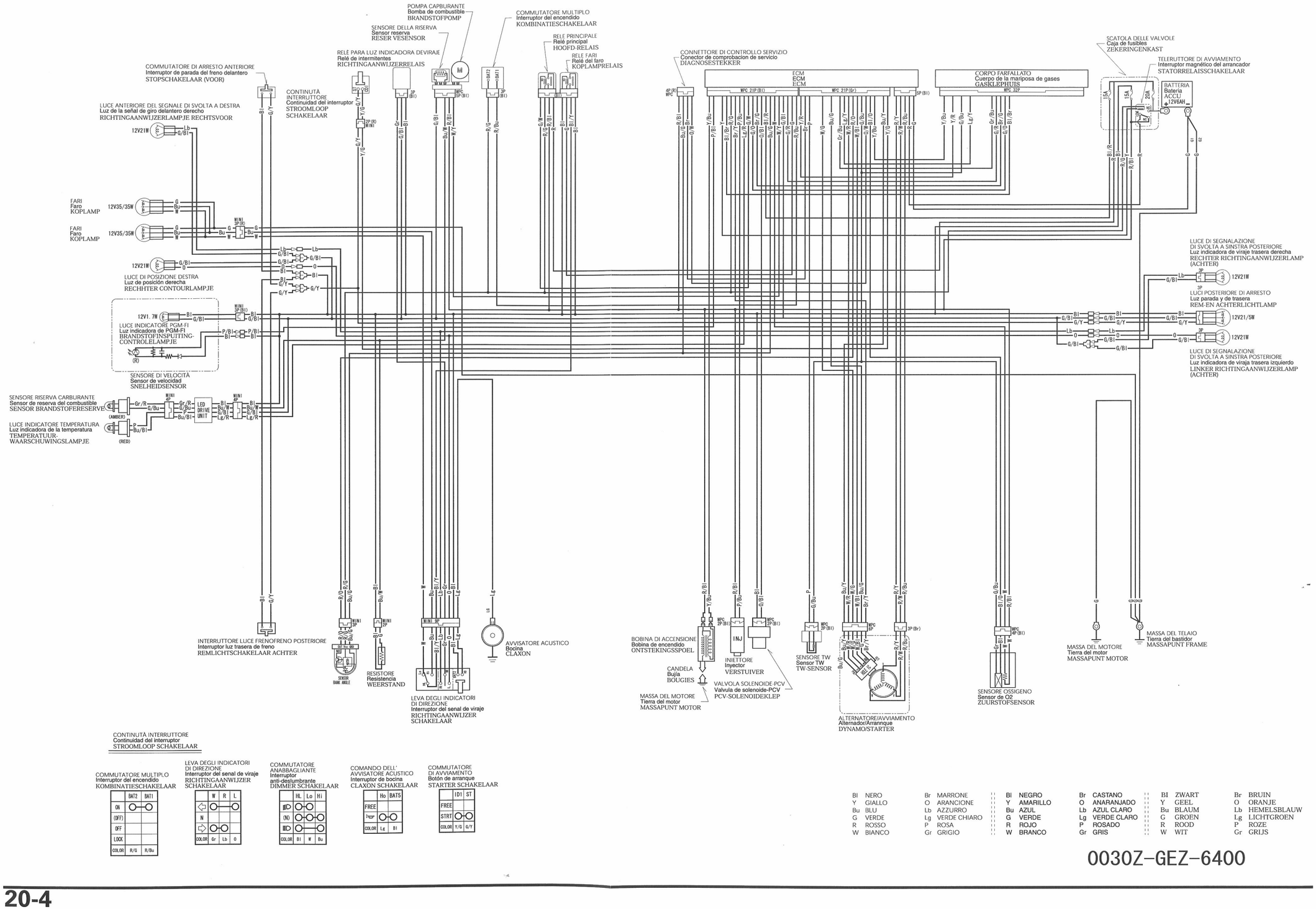
MEMO

20. WIRING DIAGRAMS

E, F, ED type (English, French, Germany) 20-3

E, F, ED type (Italian, Spanish, Dutch) 20-4

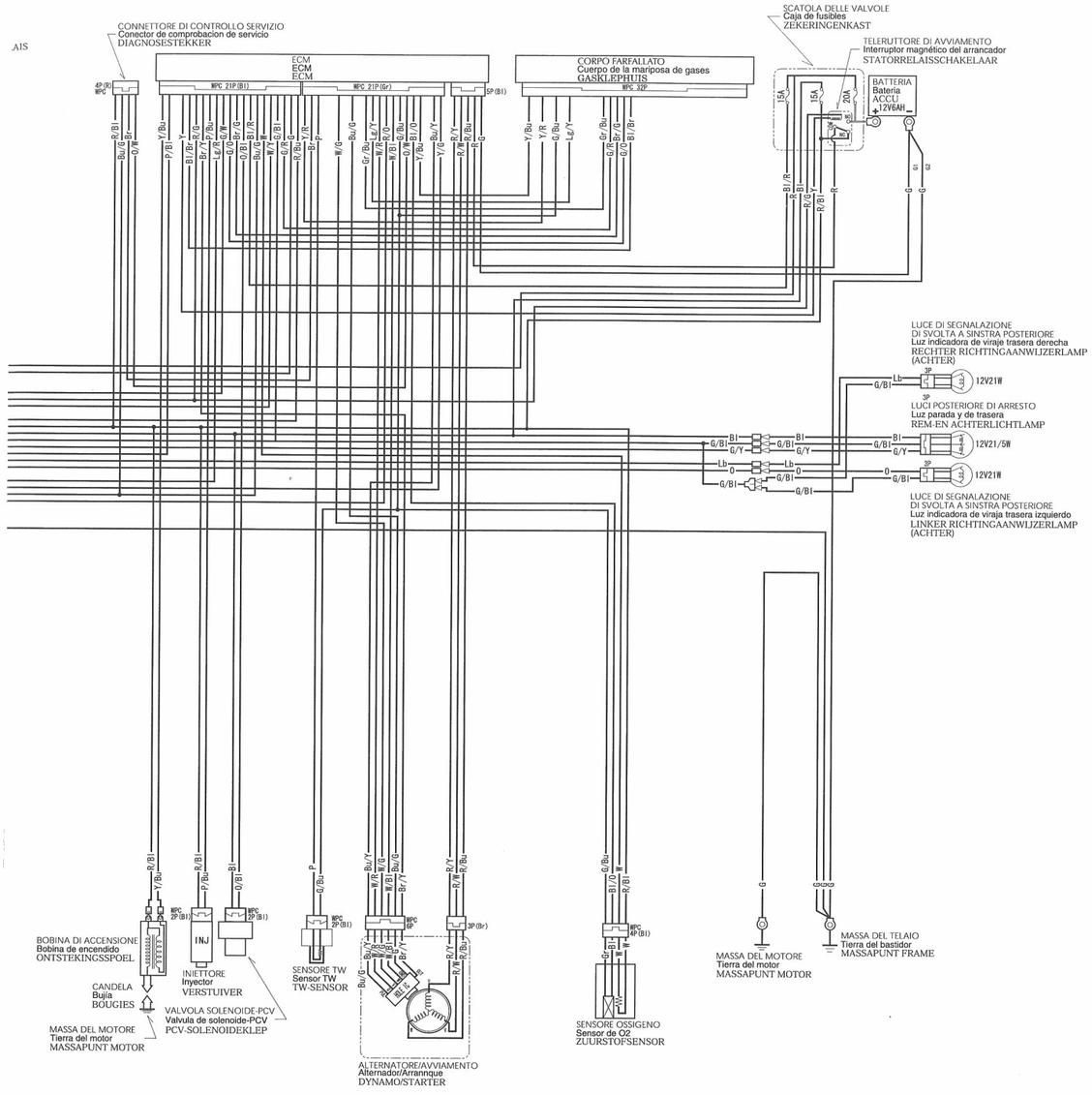
E, F, ED type (Italian, Spanish, Dutch)



Bl NERO	Br MARRONE	Bl NEGRO	Br CASTANO
Y GIALLO	O ARANCIONE	Y AMARILLO	O ANARANJADO
Bu BLU	Lb AZZURRO	Bu AZUL	Lb AZUL CLARO
G VERDE	Lg VERDE CHIARO	G VERDE	Lg VERDE CLARO
R ROSSO	P ROSA	R ROJO	P ROSADO
W BIANCO	Gr GRIGIO	W BRANCO	Gr GRIS

Bl ZWART	Br BRUIN
Y GEEL	O ORANJE
Bu BLAUM	Lb HEMELSBLAUW
G GROEN	Lg LICHTGROEN
R ROOD	P ROZE
W WIT	Gr GRIJS

0030Z-GEZ-6400



Bl	NERO	Br	MARRONE	Bl	NEGRO	Br	CASTANO
Y	GIALLO	O	ARANCIONE	Y	AMARILLO	O	ANARANJADO
Bu	BLU	Lb	AZZURRO	Bu	AZUL	Lb	AZUL CLARO
G	VERDE	Lg	VERDE CHIARO	G	VERDE	Lg	VERDE CLARO
R	ROSSO	P	ROSA	R	ROJO	P	ROSADO
W	BIANCO	Gr	GRIGIO	W	BRANCO	Gr	GRIS

Bl	ZWART	Br	BRUIN
Y	GEEL	O	ORANJE
Bu	BLAUM	Lb	HEMELSBLAUW
G	GROEN	Lg	LICHTGROEN
R	ROOD	P	ROZE
W	WIT	Gr	GRIJS

0030Z-GEZ-6400

21. TROUBLESHOOTING

ENGINE DOES NOT START OR IS HARD TO START 21-2

ENGINE LACKS POWER 21-3

POOR PERFORMANCE AT LOW AND IDLE SPEED 21-5

POOR PERFORMANCE AT HIGH SPEED 21-6

POOR HANDLING 21-7

ENGINE DOES NOT START OR IS HARD TO START

1. **Spark Plug Inspection**

   Remove and inspect spark plug.

   Is the spark plug in good condition?

   NO – • Incorrect spark plug heat range
   • Incorrect spark plug gap
   • Dirty air cleaner

   YES – GO TO STEP 2.

2. **Spark Test**

   Perform spark test.

   Is the spark good?

   NO – • Faulty spark plug
   • Loose or disconnected ignition system wires
   • Faulty ignition coil
   • Broken or shorted spark plug wire
   • Broken or shorted ignition coil
   • Faulty ignition switch
   • Faulty alternator/starter
   • Faulty engine control module (ECM)

   YES – GO TO STEP 3.

3. **Programmed Fuel Injection System Inspection**

   Check the fuel injection system.

   Is the fuel injection system normal?

   NO – Faulty fuel injection system (page 6-5)

   YES – GO TO STEP 4.

4. **Cylinder Compression Inspection**

   Test the cylinder compression.

   Is the compression specified?

   YES – • Valve stuck open
   • Worn cylinder and piston rings
   • Damaged cylinder head gasket
   • Seized valve
   • Improper valve timing

   NO – GO TO STEP 5.

5. **Engine Start Condition**

   Start by following normal procedure.

   Is the engine start but stops?

   YES – • Leaking throttle body insulator
   • Faulty IAC valve
   • Improper ignition timing
   • Contaminated fuel

ENGINE LACKS POWER

1. **Drive Train Inspection**

   Raise the front wheel off the ground and spin it by hand.

   Does the wheel spin freely?

   NO – • Brake dragging
   • Worn or damaged wheel bearings
   • Bent axle

   YES – GO TO STEP 2.

2. **Tire Pressure Inspection**

   Check the tire pressure.

   Is the tire pressure correct?

   NO – • Faulty tire valve
   • Punctured tire

   YES – GO TO STEP 4.

3. **Drive Belt Inspection**

   Check the drive belt width.

   Is the drive belt width within specification?

   NO – • Worn drive belt

   YES – GO TO STEP 4.

4. **Clutch Inspection**

   Accelerate rapidly.

   Does the engine speed change accordingly?

   NO – • Clutch slipping
   • Worn clutch shoes/outer
   • Weak driven face spring
   • Weight roller stuck

   YES – GO TO STEP 5.

5. **Engine Performance Inspection**

   Accelerate lightly.

   Does the engine speed increase?

   NO – • Faulty IAC valve
   • Clogged air cleaner
   • Restricted fuel flow
   • Clogged muffler
   • Clogged fuel cap breather
   • Faulty fuel pump
   • Faulty TP sensor

   YES – GO TO STEP 6.

6. **Spark Plug Inspection**

   Remove and inspect the spark plug.

   Is the spark plug in good condition?

   NO – • Plug not serviced frequently enough
   • Incorrect spark plug heat range
   • Incorrect spark plug gap

   YES – GO TO STEP 7.

7. **Engine Oil Inspection**

   Check the oil level and condition.

   Is the engine oil in good condition?

   NO – • Oil level too high
   • Oil level too low
   • Contaminated oil

   YES – GO TO STEP 8.

8. **Ignition Timing Inspection**

   Check the ignition timing.

   Is the ignition timing within specification?

   NO – • Faulty ECM
   • Faulty alternator/starter
   • Improper valve timing

   YES – GO TO STEP 9.

9. **Cylinder compression Inspection**

   Test the cylinder compression.

   Is the compression within specification?

   NO – • Valve clearance too small
   • Worn cylinder and piston rings
   • Seized valve
   • Improper valve timing
   • Leaking/damaged cylinder head gasket

   YES – GO TO STEP 10.

10. **Programmed Fuel Injection System Inspection**

    Check the fuel injection system.

    Is the fuel injection system normal?

    NO – Faulty fuel injection system (page 6-5)

    YES – GO TO STEP 11.

11. **lubrication Inspection**

    Remove the cylinder head cover and inspect for signs of proper lubrication.

    Is the valve train lubricated properly?

    NO – Clogged oil passage

    YES – GO TO STEP 12.

12. **Overheating Inspection**

    Check for engine overheating.

    Is the engine overheating?

    YES – • Coolant level too low
    • Thermostat stuck closed
    • Excessive carbon build-up in combustion chamber
    • Use of poor quality fuel
    • Clutch slipping
    • Lean fuel mixture

    NO – GO TO STEP 13.

13. **Engine Knocking Inspection**

    Accelerate or run at high speed.

    Is the engine knocking?

    YES – • Worn piston and cylinder
    • Wrong type of fuel
    • Excessive carbon build-up in combustion chamber
    • Ignition timing too advanced (faulty ECM)
    • Lean fuel mixture

    NO – • Engine does not knock

POOR PERFORMANCE AT LOW AND IDLE SPEED

1. **Spark Plug Inspection**

   Remove and inspect the spark plug.

   Is the spark plug in good condition?

   NO – • Plug not serviced frequently enough
   • Incorrect spark plug heat range
   • Incorrect spark plug gap

   YES – GO TO STEP 2.

2. **Ignition Timing Inspection**

   Check the ignition timing.

   Is the ignition timing within specification?

   NO – • Faulty ECM
   • Faulty alternator/starter
   • Improper valve timing

   YES – GO TO STEP 3.

3. **Programmed Fuel Injection System Inspection**

   Check the fuel injection system.

   Is the fuel injection system normal?

   NO – Faulty fuel injection system (page 6-5)

   YES – GO TO STEP 4.

4. **IAC Valve Inspection**

   Check the IAC valve.

   Is the IAC valve OK?

   NO – Faulty IAC valve

   YES – GO TO STEP 5.

5. **Intake Manifold Leaking Inspection**

   Check for leaks at the intake manifold and throttle body insulator.

   Does it leak?

   YES – • Loose intake manifold mounting bolt
   • Damaged insulator
   • Damaged O-ring

   NO – GO TO STEP 6.

6. **Spark Test**

   Perform spark test.

   Is the spark good?

   NO – • Faulty carbon or wet fouled spark plug
   • Faulty ECM
   • Faulty ignition coil
   • Broken or shorted spark plug wire
   • Faulty alternator/starter
   • Faulty ignition switch
   • Loose or disconnected ignition system wires

   YES – • Carburetor not serviced frequently enough
   • Improperly adjusted valve clearance

POOR PERFORMANCE AT HIGH SPEED

1. **Ignition Timing Inspection**

   Check the ignition timing.

   Is the ignition timing within specification?

   NO – • Faulty ECM
   • Faulty alternator/starter
   • Improper valve timing

   YES – GO TO STEP 2.

2. **Fuel Line Inspection**

   Disconnect the fuel hose at the injector.

   Does the fuel flow freely?

   NO – • Clogged fuel line
   • Clogged fuel cap breather
   • Clogged fuel filter
   • Faulty fuel pump
   • Loose or disconnected fuel pump system line

   YES – GO TO STEP 3.

3. **Programmed Fuel Injection System Inspection**

   Check the fuel injection system.

   Is the fuel injection system normal?

   NO – Faulty fuel injection system (page 6-5)

   YES – GO TO STEP 4.

4. **Spark Plug Inspection**

   Remove and inspect the spark plug.

   Is the spark plug in good condition?

   NO – • Plug not serviced frequently enough
   • Incorrect spark plug heat range
   • Incorrect spark plug gap
   • Air cleaner dirty

   YES – GO TO STEP 5.

5. **Valve Timing Inspection**

   Check the valve timing.

   Is the valve timing correct?

   NO – Cam sprocket not installed properly

   YES – GO TO STEP 6.

6. **Valve Spring Inspection**

   Check the valve springs.

   Is the valve spring free length within specification?

   NO – Faulty valve spring

   YES – GO TO STEP 7.

7. **Camshaft Inspection**

   Remove and inspect the camshaft.

   Is the cam lobe height within specification?

   NO – Faulty camshaft

   YES – Camshaft is OK

POOR HANDLING

Steering is heavy
- Steering top cone race too tight
- Damaged steering head bearings

Either wheel wobbles
- Excessive wheel bearing play
- Bent rim
- Excessively worn engine mounting bushing
- Bent frame

The scooter pulls to one side
- Front and rear wheel not aligned
- Faulty shock absorber
- Bent fork
- Bent axle
- Bent frame

MEMO

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